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Under Ten Millions

ACCORDING to the latest returns available there were in 1934-35 429 electricity supply undertakings which sold less than 10 million kWh each. Although these represented about two-thirds of the total number of undertakings, their sales accounted for only 7½ per cent. of all the electricity sold.

It was these concerns that the McGowan Committee suggested should be absorbed or amalgamated in its proposed reorganisation of electricity distribution, and, naturally enough, they are protesting and a well-attended conference was held last week to register their protest.

While the doom which hangs over them (assuming, as some do, that the McGowan Report is to be acted upon) must excite all the usual sympathy for the "small man" struggling against great odds, something more than sympathy is necessary to secure the remission of the sentence. Have these small undertakings a case for continued existence? They consider that they have and at the conference their representatives put forward a number of matters for consideration.

But let us say, first of all, that the McGowan Committee itself recognised (para. 150) that:—

> "this defined limit of size must not be regarded as any theoretical measure of efficiency in individual cases, but rather as a broad practical means of determining the nature of the administrative machinery which would only operate after a scheme had been prepared and the relevant circumstances of each undertaking had been taken into account."

Speakers at the conference, however, were concerned with the nature of the inquiry implied in this paragraph. They insisted that the inquiry should be a public one by an impartial adjudicator, whereas the Committee suggested that the work should be undertaken by District Commissioners. It was thought that, as the latter were to be appointed by the Electricity Commissioners, whose ideas of reorganisation were embodied in the Report, they would be merely agents for executing the Electricity Commissioners' wishes.

An important point stressed at the conference was the fact that some of the small undertakings were supplying electricity at a lower price than some large ones. This is undoubtedly true, but by no means general. From the public standpoint it is a matter which must be considered; there should be no rise in the cost of energy as a result of reorganisation.

There was a feeling at the conference that the I.M.E.A. had not properly looked after the interests of its smaller members, but Mr. Price F. White, of Bangor, pointed out that the dissatisfied members could requisition a special general meeting if they wished to do so. It may be mentioned that Mr. White was one of the three I.M.E.A. representatives who gave evidence before the McGowan Committee. As he is engineer of an undertaking whose sales were only 2.03 million kWh in 1934-35, it must be agreed that the importance of the small undertakings was recognised by the I.M.E.A., though we have to confess that the nature of the evidence has not been divulged to us.

While there is little doubt that many of the small concerns cannot fulfil present-day requirements and must give way to some better arrangement, they should be given a fair trial and full regard should be paid to the merits which many small undertakings undoubtedly possess.

Installation Engineering

MR. H. T. YOUNG, in the opening of his presidential address to the Institution of Electrical Engineers, mentioned three ways in which the occasion was a memorable one. It was the first presidential address to the Institution in the reign of King Edward VIII—its patron; it was the first meeting of that body in an all-electric building; it was an acknowledgment given to the installation and contracting section of the electrical industry. As to the second point, the sultry evening provided a severe test of the efficacy of the new system of electric heating and air conditioning. That

the atmosphere appeared not to be conducive to somnolence must perhaps in part be attributed to the invigorating quality of the address in which Mr. Young made point after point that implicitly indicated how very much more there is in installation work than is dreamed of in the philosophy of those who have not kept in touch with its present ramifications. The part of his address that needs most emphasising is the need for the most adequate advance planning of services in large buildings, many of which to-day (and those not completely electrified) use more electricity than the total output of several supply undertakings.

The E.C.A.'s Move

THE activities of that ever-active body, the Electrical Contractors' Association, and those of its allied organisations, have increased very considerably during the last year or two. This has been due mainly to the fact that the membership has grown by 30 per cent. in the last six years. Another factor which has added a great deal to the work of its officials and staff is the formation of the National Association of Radio Retailers, Ltd., whose aims and objects we have already mentioned in these pages. An even more important development is foreshadowed. At present the trading organisation, as its title implies, is a National Electrical *Contractors'* Trading Association, but there are many electrical traders who do not carry out installation work as well, and at present they are not catered for. These need an organisation for their own protection (to say nothing of the protection of contractor-retailers), and a special committee has the matter under consideration. Not only in anticipation of this, but also to enable the current activities to be carried out more expeditiously, the Association and its allies are shortly moving to more commodious and more centrally situated premises at Africa House, Kingsway, W.C.2. From our acquaintance with the present E.C.A. headquarters we have no hesitation in saying that the move is amply justified.

Are Contractors Electrical?

AT the last annual dinner of the Electrical Contractors' Association Mr. A. G. Bruty, who was then president, asked how many of the electrical men present could boast of all-electric homes. Guilty blushes suffused the countenances of a very large proportion of the diners, but subsequently Mr. H. Marryat said he considered that electrical contractors stood well in this respect. The full and proper use of electricity is largely dependent upon its price; if the price is reasonable, electrical men are unreasonable if they do not "take their own medicine." Our reminiscences are prompted by an account of a census among electrical contractors in the Birmingham and S.W.S. areas, the results of which are mentioned in our "Business Notes." While the average consumption compares well with the general average, we would not say that it represented the best practice. For instance, what are twenty-one of the fifty-nine contractors doing with "gas, etc.," cookers? They really should cook electrically. We are pleased to see that among the Birmingham contractors electric water-heating is popular. As to the price of energy, while the 0.9d. per kWh in Birmingham is fairly satisfactory, the S.W.S. figure of 1.17d. is a little high, although increased use might reduce the average somewhat.

Rural Obstruction

IN dealing with applications of supply undertakings for permission to erect overhead lines—mostly in rural areas where underground cables are out of the question on account of expense—the Ministry of Transport must take cognisance of the attitude of local authorities concerned. In many cases, while not favouring the use of overhead lines, the authorities give their consent because of the eagerness of the inhabitants to secure the advantage of an electricity supply. Sometimes, however, local authorities are influenced—too much we feel—by bodies professing to see in overhead lines a blot on the landscape that must be prevented at all costs. A case in point is the rural area around Great Yarmouth. The municipal undertaking has pursued an active policy in regard to rural extensions, but Mr. P. E. Rycroft, the engineer and manager, complains of uniform obstruction in certain parts of the district from newly formed Town Planning Committees whenever overhead-line extensions are proposed. It is generally safe to say that people in villages cannot afford to pay at a high rate for the privilege of having electricity, but their lives can be made much more congenial by its use. Greater recognition should be given to the difficult position of the supply undertaking in its efforts on their behalf.

North Wilford

THE River Trent at Nottingham can provide enough condensing water for the efficient operation of at least 200,000 kW, and as, other things being equal, it is clearly advantageous to generate near the centre of the load (especially if there are coalfields in the vicinity) it is a fitting tribute to the rapid progress made recently under the management of Mr. G. H. Lake that North Wilford should have been extended. The original scheme provided for 50,000 kW of additional plant, but owing to the need for accelerating the programme, the installation of a 30,000 kW unit provided the easiest solution, and this was running within the short space of sixteen months after receiving the directions of the Central Electricity Board. An increase in alternator capacity of from 58,500 to 85,500 kW does not entirely represent the position, as the evaporative capacity of the new boilers is much greater in proportion and considerably exceeds that of the existing boiler-house. Notable features are the adoption of pulverised-fuel firing (with electrostatic dust precipitators) and the use of higher steam conditions. Last year the thermal efficiency of the station on a sent-out basis was 18.16 per cent., but the new plant should enable North Wilford to rise to over 20 per cent.

Electricity and Local Rates

THE article in this issue dealing with the incidence of local rates upon electricity undertakings is timely in view of the imminent municipal elections. It shows how many electricity departments have to bear an inequitable proportion of local taxation through the progressive increase in valuation—an increase that has been out of all proportion to the rise in revenue in many cases. The author also raises the question of "voluntary" contributions to the rate fund from electricity departments' surpluses, whereby the undertakings (or their consumers) are made to pay a little more on top of the excessive amounts already extracted from the profits. The depredations of local authorities have been curbed somewhat by the limit imposed by the 1926 Electricity (Supply) Act, but this merely regularised a debatable principle. We do not expect the article to have any effect upon the results of next week's elections, for all parties are equally guilty of this nefarious practice.

Land Drainage

THE choice of prime mover for pumping usually lies between the electric motor and the Diesel engine acting without the aid of electrical equipment. A £500,000 scheme for draining the flood areas of North Somerset is commented on in a South Wales daily, the writer deprecating a possible application of public funds to the subsidising of imported fuel. He points out that if Diesels are purchased out of the Government grant (said to be 60 per cent.) towards the cost of the scheme, those benefiting by it will be called upon to pay only the operating charges. On the other hand, the tariff for electricity supplied by the power company will have to include the standing charges on its plant and mains, so that a comparison between the two methods on this basis would be prejudicial to the electrical case. The article is written with the interests of the coal-fields in mind. From the electrical point of view, pumping schemes provide an economic incentive for extensions into rural areas.

Extensions at North Wilford

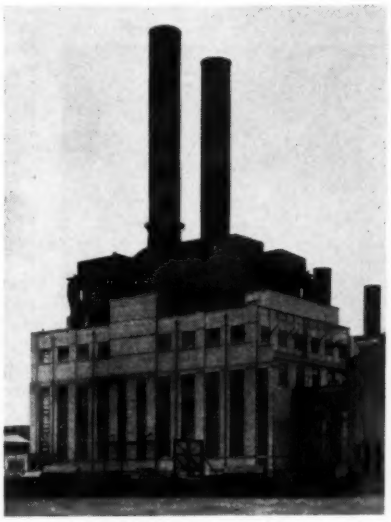
Some details of the new Nottingham plant

THE first section of North Wilford Power Station of the Nottingham City undertaking, consisting of three 10,000 kW turbo-alternators and six boilers, was put into commission in 1925 and a 20,000 kW set with two more boilers was added in 1928.

On account of the suitability of the 80-acre site on the River Trent for a base-load station and also because of the rapid increase in load, it was decided in 1934 to install further plant. How active has been the development lately is shown by an increase in the number of consumers from 26,800 in 1930 to 96,380 at March 31st last. During the same period the kW connected rose from 67,600 to 249,500, the m.d. from 25,900 to 49,200 kW, and kWh sold to consumers from 51 million to 120 million.

An extension of 30,000 kW was formally inaugurated last week. Steam conditions of the new plant are 625 lb. per sq. in. and 850 deg. F., as compared with 350 lb. and 700 deg. in the earlier plant, and pulverised fuel firing has been adopted instead of automatic stokers.

The new steam-raising plant consists of four boilers of the combustion steam generator type with individual evaporative capacities (m.c.r.) of 200,000 lb. per hr., and heating surfaces of 19,810 sq. ft. The combustion chamber walls are formed of closely pitched tubes supplemented by banks of tubes lying transversely across the top and bottom. Above the top bank is a Melesco horizontal superheater with a heating surface of 4,750 sq. ft. A convection bank of vertical tubes is connected to the top and bottom main drums.



The North Wilford station, Nottingham

In the construction of the largest hollow-forged seamless boiler drums (4 ft. 6 in. internal diameter and 4¾ in. thick) an ingot weighing 115 tons was used, the ultimate weight being 40 tons. Each boiler is capable of steaming 130,000 lb. per hr. when one of the duplicate pulverising mills and draught fans are working.

A new boiler house receives coal from 12-ton wagons, which, after weighing, pass to a rotary tippler, where the contents are discharged into a 30-ton hopper. From the latter the coal is taken by belts and elevators to roof level and delivered on to transverse belt conveyors fitted with magnetic pulleys for collecting tramp iron. Two shuttle belt conveyors carry the coal from these to the 1,000-ton raw-coal bunkers. The capacity of this plant is 60 tons per hr.

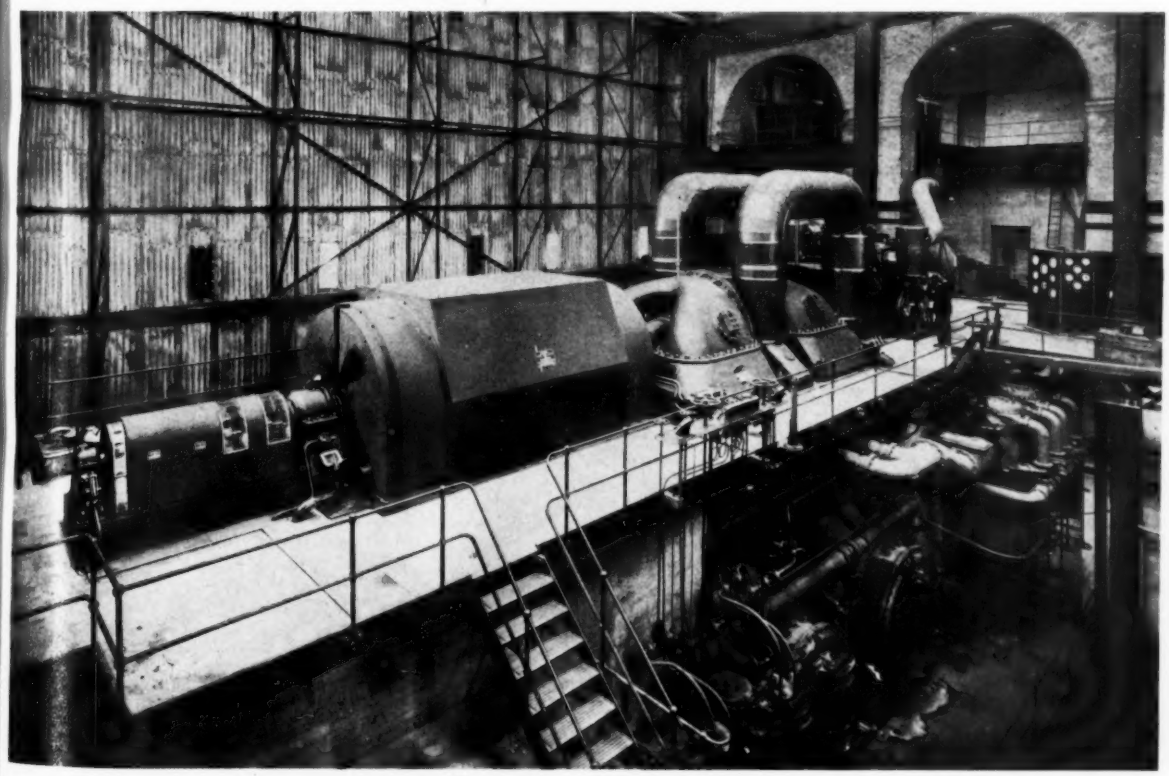
From the bunkers the coal is discharged through automatic weighers to feeders for the pulverising mills (driven by 110-h.p. motors), in which spring-loaded fixed rollers are driven by friction contact with material on a rotating table. They are designed to deal with 6 tons per hour of Midland slack with 15 per cent. moisture content, so that 80 per cent. passes a 200 mesh screen. Hot air carries off the coal particles through rotary separators, which return the larger particles to the mill, and the coal-air mixture is drawn through a 105-h.p. exhauster fan and sent to the burners. The speed of the mills and their auxiliaries can be controlled from a central operating floor.

Each pulveriser supplies two inter-tube burners at opposite corners of the square combustion chamber and secondary air at 450 deg. F. is supplied round the burner pipes through ducting from the plate-type air preheater which reduces the leaving gas temperature to 280 deg. Forced-draught fans discharge the air through the air heaters to the burner boxes and to the pulverising mills.

Both forced-draught and induced-draught fans are of the single inlet type fitted with remotely operated vane control and driven by two-speed motors. Centrifugal grit separators are incorporated in the induced-draught fans. Twin tube economisers with 3,528 sq. ft. of heating surface increase the feed temperature by 50 deg.

A system of steam-jet blowers cleans the surfaces of the economiser, boiler and super-heater tubes. Ash and dust from the combustion-chamber hoppers, boiler hoppers and grit collectors are led to a water sluice beneath the boilers and thence to a swirl pit from which the slurry is pumped to waste land.

One Sturtevant electrostatic precipitator per boiler has been

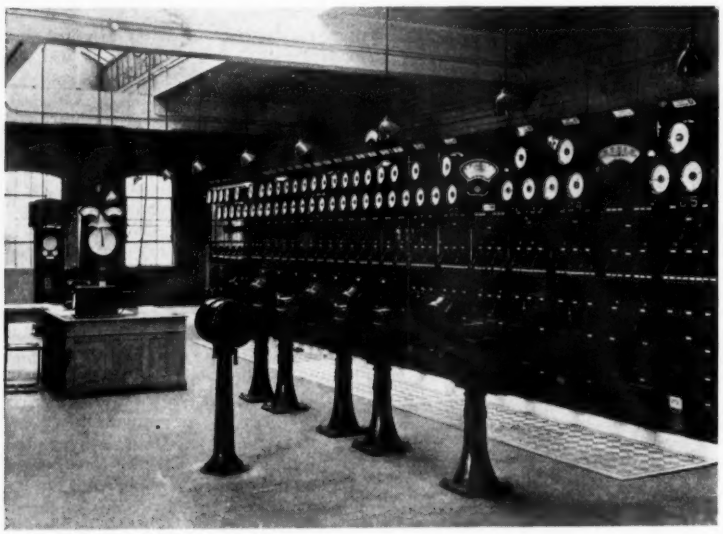


The new 30,000-kW turbo-alternator and condenser plant

installed on the roof and the dust from these goes to a Hardinge rotary thickener from which the slurry is drawn off by pumps to a rotary vacuum filter. The cake deposited on the filter drum is scraped off and taken by belt conveyor to wagons.

The gases from the precipitator travel to two stacks (one for each boiler) of Cuprador steel which stand on the boiler-house roof rising to 240 ft. above basement level; the diameter at the top is 16 ft.

Three feed pumps, each with a duty of 330,000 lb. per hour, are installed in a turbine-room annexe adjacent to the boiler house. Two are motor driven; and the third, which is steam-driven, automatically comes into service should the others fail. The new steam range is connected to the old through a reducing valve and desuperheater which have a capacity of 300,000 lb. per hr. Condensate from this steam is returned to the new feed pumps by a de-aerator and booster pump.



The main control board

The boilers are blown down through a common range to a large tank vented to atmosphere, the contents of which are drained to a sump pit and pumped into the river. All joints on the h.p. steam mains, feed pipes and blow-down pipes are of the "Corwell" welded type.

With the installation of the new 30,000-kW, 3,000-r.p.m. turbo-alternator the available space in the existing turbine room is filled. The turbine is of two-cylinder, impulse-reaction design with twenty-two stages in the h.p. cylinder and seven opposed double-flow stages in the l.p. cylinder. Three stages of bled-steam feed heating are incorporated, the temperature of the water leaving the last heater being 295 deg. F.

The 11-kV alternator has a maximum continuous rating of 37,500 kVA at 0.8 power factor. The weight of the welded steel stator is 60 tons and of the complete machine 222 tons.

The closed air ventilation system with tubular air coolers mounted below the machine in the foundation block can be opened to the engine room in the event of failure of the water supply. Instruments for indicating pressures and temperatures throughout the machine are mounted on a gauge cabinet at the steam end of the turbine.

Steam from the turbine exhausts to twin two-pass condensers each with a cooling surface of 13,000 sq. ft. These are designed to give a vacuum of 28.9 in. Hg. (bar. 30 in.) with ten per cent of tubes plugged when supplied with 19,600 gal. per min. of circulating water at 55 deg. F. Duplicated extractor pumps deliver the condensate to the closed feed-heating system, passing it through the first two heaters to the feed pumps which in turn discharge through the final heater to the boilers. Each of the two surface-type two-stage steam-jet air ejectors is capable of removing all non-condensible gases from the condensers.

A closed-feed controller fitted in the condensate system ensures that all make-up passes through the condenser, where it is deaerated, and also deals with surges due to change of load, surplus condensate being passed to a surge tank. Two coil-type integral evaporators, each supplying up to 12,000 lb. of make-up feed water per hr., are arranged to work singly between the intermediate- and low-pressure bled-steam points.

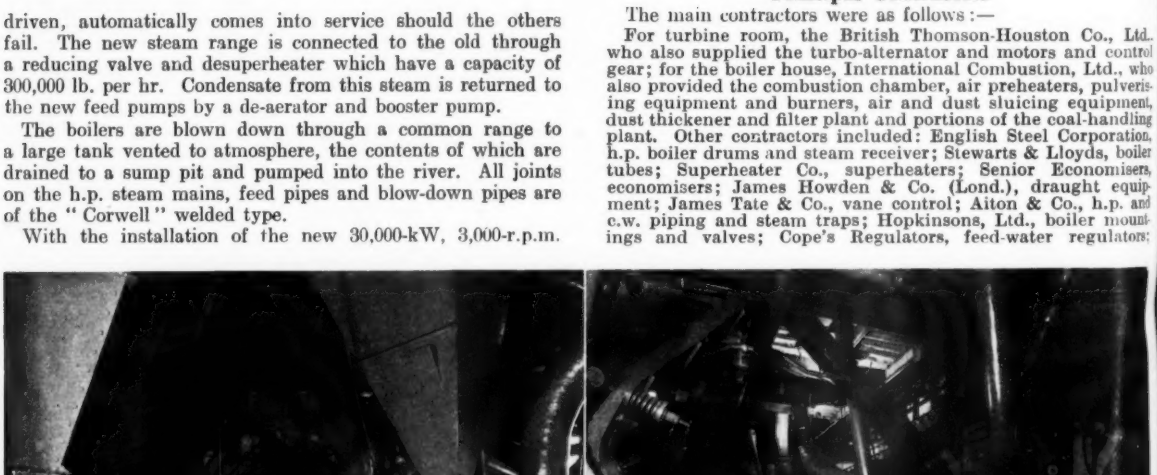
Condensing water is taken from the River Trent on a siphonic system, though the existing inlet culvert, by two pumps each with a separate pipe line to the condensers. All circulating-water valves are hydraulically operated.

Mr. G. H. Lake, the city electrical engineer and general manager, was responsible for all design and construction of all sections of the extension.

Principal Contractors

The main contractors were as follows:—

For turbine room, the British Thomson-Houston Co., Ltd., who also supplied the turbo-alternator and motors and control gear; for the boiler house, International Combustion, Ltd., who also provided the combustion chamber, air preheaters, pulverising equipment and burners, air and dust sluicing equipment, dust thickener and filter plant and portions of the coal-handling plant. Other contractors included: English Steel Corporation, h.p. boiler drums and steam receiver; Stewarts & Lloyds, boiler tubes; Superheater Co., superheaters; Senior Economisers, economisers; James Howden & Co. (Lond.), draught equipment; James Tate & Co., vane control; Aiton & Co., h.p. and c.w. piping and steam traps; Hopkinsons, Ltd., boiler mountings and valves; Cope's Regulators, feed-water regulators; Gwynne's Pumps, ash and sluice-water pumps; Sturtevant Engineering Co., electrostatic dust precipiators; Metropolitan-Vickers Electrical Co., switchgear, motors and control gear, remote-operation boards; Ivor Power Speciality Co., soot blowers; Wallsend Slipway & Engineering Co., oil-firing equipment; Cambridge Instrument Co., International Gas Detectors, and Budenberg Gauge Co., instruments; British Arca Regulators, pressure-reducing and desuperheating equipment; Callender's Cable & Construction Co., cables; Hackbridge Electric Construction Co., transformers; Worthington-Simpson, condensing plant and feed-heating equipment; G. & J. Weir, feed pumps.



Left: View of the exhauster floor showing coal feeders, exhauster, fans and front of boiler with burner box. Right: Coal-pulverising mills in the boiler house basement

Electricity and Local Rates. By G. V. Harrap

The need for a uniform method of assessment

THE basis of assessment of electricity undertakings for local rates rests upon legislation long outmoded in its application. A recommendation for its revision was put forward in paragraphs 458 to 463 of the Report of the McGowan Committee. The unequal incidence of this form of taxation has been tabulated and commented upon by Messrs. J. N. Waite[1] and R. W. Willis[2],

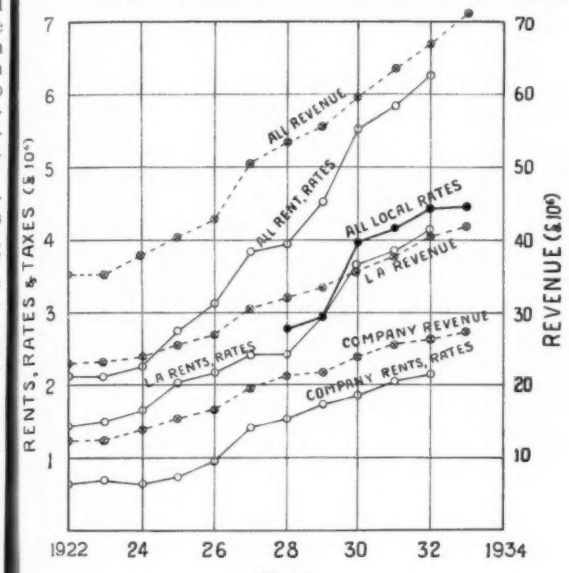


Fig. 1

but no attempt appears to have been made to show these inequalities in graphical form.

The first question arising in an inquiry such as this, is whether its importance is so great as is supposed. Fig. 1 has been prepared to answer this query, and it illustrates how great has been the rise in the amounts paid by the industry. The figures for these curves have been extracted from the Electricity Commissioners' Returns. Unfortunately, the relative importance of local rates was not at first realised, and hence only the curves of rents, rates and taxes have been plotted for the full period. In 1928 it was becoming obvious that local rates were growing, and from that date the item was separately detailed. In the figure comparison has been made with total revenue, and also with the revenue accruing to local authorities and companies.

It will be noticed how rapid has been the rise in the total rents, rates and taxes, and the local rates (where shown), after each year corresponding to the quinquennial valuations. The increase has been greater than the rise in revenue (195 per cent. to 102 per cent.), although the professed basis of rateable value is revenue and profits. This disproportionate rise (6.0 per cent. to 9.4 per cent. of revenue) may be partly due to the increase of rate poundage of recent years, but the larger valuations now in force have also contributed. In a valuation for local rates, it has been established that rating committees may legitimately budget for an expansion in the profits of an undertaking, and use has evidently been made of this ruling. It will also be apparent from a study of the figure that local authorities have suffered most in this increase; perhaps there may be some explanation in the fact that rating is carried out by local authority committees.

Range of Incidence

We have seen how this taxation bears upon the whole industry; what is its incidence upon the various individual undertakings? The point that is exercising most inquiring minds is not so much the size of the burden, though that in itself is considerable and requires reduction, but its inequality. The limiting points are, therefore, the values to be sought, and from the returns of all undertakings the highest and lowest payments of local rates have been extracted for the latest available year, and referred to a basis of revenue.

The result is shown in fig. 2, and it will be appreciated that there must be many injustices hidden within the shaded portion of the curve. It is noticeable how great is the variation in the higher values of revenue, and thus the normal expansion of an undertaking may increase local rates far more than other expenditure. There would appear to be no calculable law by which any increase of local rates can be forecast, although the mean value follows a square law of the type $y = Ax^2 + B$.

The above figure does not just take account of special cases as fig. 3 shows. A double logarithmic scale was used for the abscissæ to give a large range of undertakings, and a linear scale for the ordinates to give a true measure of the relationship of the amounts paid. The range of undertakings includes those from £10,000 to £1,000,000 revenue, *i.e.*, inclusive of most progressive departments and companies.

The method of computation of rateable value is given in the Rating and Valuation Act, 1925 (15 and 16 Geo. 5, c.90) S.22(1)b, as follows:—"For such a hereditament there shall be estimated the rent at which the hereditament might reasonably be expected to let from year to year if the tenant undertook to pay all usual tenant's rates and taxes and tithe rentcharge, if any, and bear the cost of repairs and insurance and other expenses, if any, necessary to maintain the hereditament in a state to command that rent, and the annual rent so estimated shall, for the purpose of this part of this Act, be taken as the rateable value of the hereditament."

This involves many fictitious quantities such as "tenant's capital," upon which an arbitrary percentage, not fixed by statute, is taken as his share in the operating costs of the undertaking. Not all the expenditure in the revenue account is allowable in the determination of this mythical value; such items as depreciation, sinking fund provisions, and insurance are computed as certain percentages of the original value of the hereditament, and are not taken at the actual value provided by the undertaker. Various others costs are called "landlord's expenses" and are eliminated from these calculations, while considerable ingenuity is exhibited in dividing the result into directly and indirectly productives, and in ascertaining their apportionment among the different rating areas.

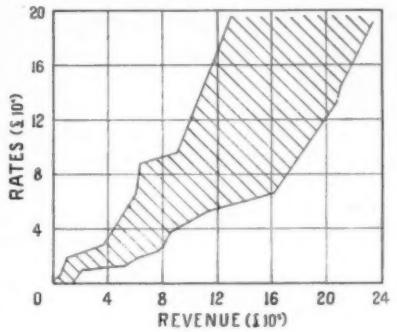


Fig. 2

Formulæ are extant for this work, and it is said that rating committees employ valuers specially qualified in utility work. The following remarks from one of the classic cases on rating law will, however, show how much reliance should be placed on these formulæ and practices, *viz.*, "It has been repeatedly held, and held by the House of Lords, that the various formulæ of valuation, as they are sometimes called, are not,

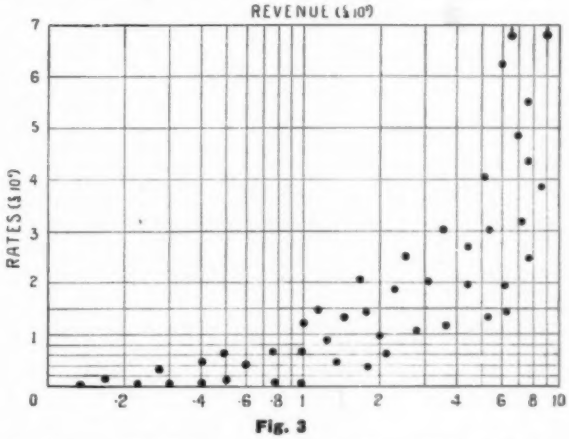


Fig. 3

nor is any one of them, an absolute and invariable rule to be applied necessarily in the valuation of a peculiar kind of property."[3]

[1]. J. N. Waite. "Rating Law and Practice, with special Reference to Electricity Undertakings." I.E.E. *Journal*. Vol. 74, p. 60. [2]. R. W. Willis. "The Assessment of Undertakings." ELECTRICAL REVIEW (April 5th, 1935, p. 482). [3] Cozens-Hardy, M.R., in London United Tramways *v.* Brentford Union (1907), 70 JP. 228; 71 JP. 249; Konstam's Rat. App .(1904-07) 87 and 410.

Such, then, is the law, but even with a knowledge of all the indeterminate variables that comprise the formulæ of valuation, it is difficult to explain the inconsistencies illustrated in the figure. In the range of £600,000 to £800,000 revenue will be seen some very large variations in the amounts paid in local rates; even though the inequalities appear small in the lower amounts of revenue, yet one undertaking receiving £100,000, pays approximately twelve times the rates of a more fortunate one. These last two figures should be conclusive evidence of the vast discrepancies that exist in the application of the rating law to electricity undertakings

Rateable Value

It might be contended, after examining fig. 3, that the inequalities arise from differing rate poundages. Fig. 4 shows

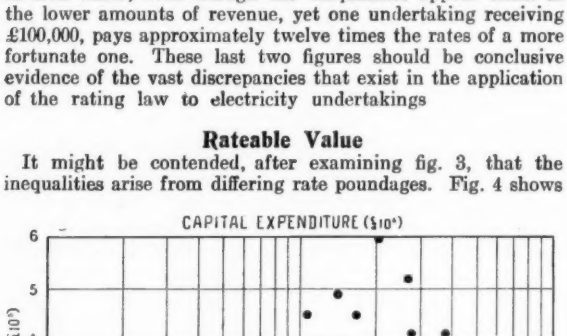


Fig. 4

rateable value against capital expenditure, and illustrates how these inequalities persist, even when the element of rate poundage is eliminated. The data was extracted from the latest report of the London and Home Counties J.E.A., and capital expenditure was chosen because it is a measure of the size and importance of an undertaking. If an abscissæ of revenue is used, similar results transpire, although not perhaps so clearly. From the report it is evident that hereditaments in the more valuable parts of London have higher rateable values than those in the East End.

Rateable value is obviously enhanced by situation and is not tied down to the capital value of the concern; in fact, it might be said that practically every extraneous circumstance is given weight in the calculations. In justice to the valuers it should be said that full allowance has to be made for statutory limitations on the undertaking.

The fault of the inequalities exhibited in the above figures lies in the manner in which the rateable value is determined. The only concrete suggestion so far put forward, is that by Mr. J. N. Waite, who advocated a form of taxation based on income. Reference to the first rating law legislation, *i.e.*, the Poor Relief Act, 1601 (43 Eliz., c. 2), reveals that this was the original intention. The change was brought about by the Parochial Assessments Act, 1836. The error must not be made, however, of assuming that such an alteration would make local rates analogous to income tax. Great inequalities occur in the incidence of the latter.

What can be done to alleviate the burden of local rates? At present the only solution is to make the revenue as low as possible, for the greater the difference between the gross income and the statutory deductions, the greater will be the assessment. Since it is the aim of all progressive undertakings to reduce their tariffs as much as possible for other reasons, it would appear that little short of legislative action will cure this evil.

"Voluntary" Contributions

Let us now turn to another aspect of this rating question. While dissatisfaction has been expressed at the size and unequal incidence of the rate burden, the contributions demanded in aid of local rates have evoked even greater criticism. Many are of the opinion that when an undertaking has paid the normal tax upon its computed annual value, it should not be called upon for a further contribution.

There is a legal limit to the amount that can be taken, but no comparison appears to have been made between this legal limit and the amounts actually appropriated. Section 7 of the Schedule to the Electric Lighting (Clauses) Act, 1899, as amended by the 1926 Act, S.43, contains, *inter alia*, the following governing condition: "the amount (of net surplus) which may be applied (in aid of the local rate) in any year must not exceed 1½ per cent. of the outstanding debt of the undertaking."

This percentage value obviously depends upon the definition of "outstanding debt." The Electricity Commissioners, in their thirteenth Annual Report, concurred in the view expressed by the Institute of Municipal Treasurers and Accountants that outstanding debt means the aggregate capital expenditure less the amount for redemption of debt, revenue contributions to capital works, and all capital receipts. This involves a definition of "aggregate capital expenditure," which means the original capital expenditure on existing assets only, less undischarged expenditure on discarded assets, deferred charges, consumers' installations, and hire purchase, &c.

Whether it is lawful to make a contribution depends upon the size of the reserve fund and its relation to the aggregate capital expenditure. We are not here concerned with the legality, but with the size of the contributions, when actually made. Do local authorities demand contributions up to the limit or are they satisfied with a less amount?

To give an up-to-date answer to the above is difficult, since the latest statistics issued by the Electricity Commissioners available at the time of writing are dated 1933. Scanty details can, however, be gleaned from various sources, although care is required in making comparisons since many undertakings use the term "net debt," which may, or may not, be synonymous with "outstanding debt."

In fig. 5 contributions to local rates have been contrasted with outstanding debt. Superimposed upon the points plotted is the legal datum line of 1½ per cent. of this debt, and it will be observed how, in most cases, the contribution approaches the full limit. The fact that three values exceed the legal limit in the figure, may be due to some difference in the composition of net debt as used by the undertakers and outstanding debt as defined by the Institute of Municipal Treasurers. Otherwise contributions of such size would be illegal.

It might be suggested that the amount demanded can be diminished by reducing the outstanding debt as speedily as possible, and this, in fact, does appear to be the only solution. This course is not always feasible since loan repayment

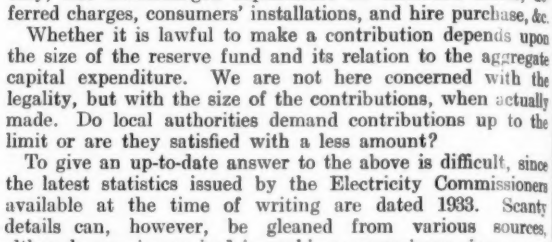


Fig. 5

is often tied to a particular period of years. This period depends upon the class of plant for which the money is lent, the plant's depreciation rate, and perhaps also upon the state of the money market at the time of borrowing. Furthermore, it is in the interests of a local council desirous of demanding large contributions in aid of the local rate, to disallow any acceleration of debt redemption and thereby keep the permissible contribution to the rates as high as possible.

Hardening Engine Parts

The present position of special steels for heavy oil engines is reviewed in a paper by Dr. S. F. Dorey, which was recently read before the Diesel Users Association in London. Brief reference is made to surface hardening by the "Tocco" process. Pins and journals are heated by high-frequency current (about 2,000 cycles per second) carried by hollow induction coils, and then rapidly quenched by water sprayed through holes in the coils. In the case of a crankshaft the pin or journal is enveloped by hinged and hollow jaws carrying the heating coils, a small air space being left between the inner surface of the jaws and the surface of the pin. The heating and cooling stages each last four or five seconds. The factors controlling the depth of penetration and the degree of hardness are the frequency and density of the electric current, the spacing of the electrodes from the surface to be hardened, and the time during which the current is applied. Any steel containing about 0.35 per cent. carbon can be hardened by this method. Hard-facing is the process of welding on to wearing parts a surface layer of an alloy offering a high resistance to wear. This method is equally applicable to new and worn parts, and a large range of electrodes is available for the purpose. A further development is the electrical deposition of chromium to a thickness of five-thousandths of an inch on the inner surface of cast-iron liners.

Nickel Research Laboratories

A large new Birmingham establishment

THE inaugural inspection of the extensive research laboratories that have been established at Birmingham by the Mond Nickel Co., Ltd., took place last week. This company represents in Europe those concerns which are now united under the title of the International Nickel Co. of Canada, Ltd. With the aid of the development section at the London headquarters and in co-operation with the corresponding organisation in America and bureaux of information in this and other countries progressively increasing data is being made available on the properties and applications of nickel and its alloys.

Mr. W. T. Griffiths manages the research and development department, while the assistant manager, Dr. L. B. Pfeil, is in charge of the new laboratories at Birmingham, which have been erected beside the works of Henry Wiggin & Co., Ltd., an associated concern that claims to be one of the world's largest individual users of nickel.

The reinforced concrete building occupies a 187 by 43 ft. site. The front is brick faced, with a circular central main staircase, Wadsworth lift, and office accommodation. Above the basement there are three floors and a pent-house on the roof. Internal columns have been largely avoided, yet the floors are designed to carry factory loads; many of the partitions are sound-insulating. To prevent the transmission of vibration the ground floor machine shop is isolated from the main structure by space filled with rubber mastic and its floor is supported on concrete columns with their own foundations below the basement floor.

In the basement is storage accommodation and also the heating and air-conditioning plant (Brightside Foundry and Engineering Co., Ltd.), air compressor and other service distribution gear.

Testing Equipment

The equipment of the mechanical testing section includes a battery of six creep testing machines, electrically heated and controlled by Zenith resistances and an Isenthal mercury switch.

The furnaces in the heat-treatment section include two of the "Birlec" type (Birmingham Electric Furnaces, Ltd.) with hearths of 24 by 12 by 8 in. and 18 by 9 by 6 in. respectively. The control panels are in the next room, connections between them and the furnaces being facilitated by holes left in the floors and wood strips cast into the ceiling of the basement.

In this adjacent room are a Cambridge temperature controller and a Leeds and Northrup type potentiometer recorder and controller, a number of potentiometers, a gradient furnace that can be raised and lowered by a small motor, a special thermo-couple calibrating furnace, and several small electric furnaces designed for thermal analysis.

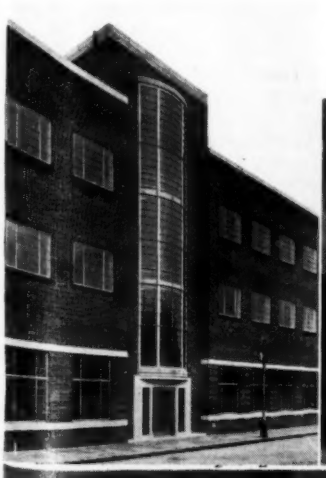
The largest room in the building is to be used later for experiments on a semi-factory scale. A corner of it is at present employed for melting operations, one of the two furnaces being of 18 lb. capacity and of the high-frequency Ajax-Northrup type, served by a B.E.T. transformer and Ellison switch. This room is provided with exhaust fans and is lighted by two G.E.C. discharge lamps in enamelled reflectors suspended from the lofty roof. Lighting elsewhere is mostly by enclosed bowl and sphere pendants, providing 14 ft.-candles on the working plane, with circular bulkhead fittings built in to the corridor ceilings. The fittings are sealed to exclude fumes.

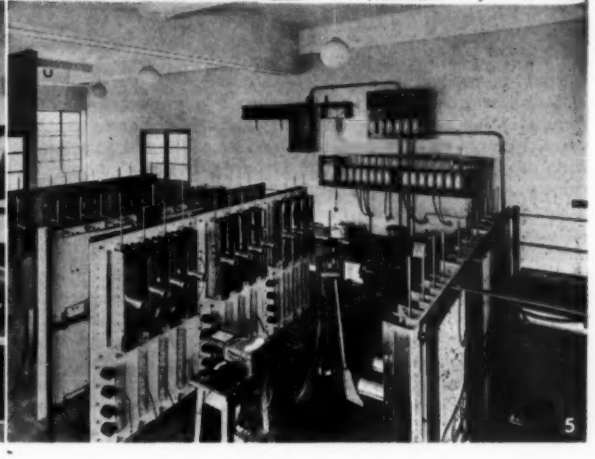
On the first floor are general and physical sections, containing a number of small furnaces, a Hughes permeameter and other magnetic testing equipment, with means of determining electrical resistivity and so forth; also central office accommodation. At the east end is a metallography section with a fan for removing fumes from the grinding and wet-polishing room; also macro-photography equipment with spot lights and dark rooms.

The west end of the second floor is devoted to the testing of electrical resistance elements and heat-resisting materials. The principal work consists of accelerated life tests on resistance wires by the Bash and Harsch method, for which there are sixty units together with a further sixty units for testing wires in the form of spirals in refractory formers. Electric fire bars, hot plates, oven and iron elements are subjected to life tests which simulate service conditions.

Other equipment includes a Leeds-Northrup type temperature recorder operating on the potentiometer system, as well as timing devices, relays, and contactors for automatically switching the elements under test on and off and instruments for recording the life of the materials under investigation.

1. Exterior of the Research and Development Laboratory. 2. "Birlec" furnaces in heat-treatment laboratory. 3. Semi-technical laboratory with h.f. furnace equipment. 4. Another interior view. 5. Wire-testing apparatus in the heat-resisting materials laboratory





On the second floor there are also electro-plating, chemical and corrosion sections with specially designed apparatus for alternate immersion, circular path and jet tests. The sea water for the jet tests is returned by air lift to a tank on the roof. Hot vats are equipped with electric immersion heaters and thermostats, a fan on the roof being arranged to exhaust fumes. A small room is provided for indoor atmospheric corrosion tests in addition to outdoor frames on the flat roof.

Electrical Distribution

The electrical installation was carried out by H. Pratt, Ltd., all the conduit being copper tube throughout, as are also the gas, water and compressed air pipes.

On every floor the following services are available: d.c. at 220 V for electrolysis and other special purposes; 50 cycle a.c. at 230 V single phase, and at 400 V three phase for the larger furnaces, all motors in the machine shop, compressor motor, fans, circulating pumps, testing machines, &c.

All the lighting is at 230 V from a 3-phase four-wire system. There are emergency and pilot lights at certain points in the building which are on a separate d.c. supply; these lights can be used if the a.c. supply fails, or if it is necessary to make "dead" the main a.c. board in the basement for alterations or repairs.

There are a large number of spare ways on the 230 V single-phase a.c. system from which variable voltage is available by means of small, air-cooled, portable transformers which can be connected to switch plugs situated on every side of each room. The circuits for these plugs are carried in wall chases fronted with removable "Sindanyo" panels on which the switch plugs are mounted. By this device apparatus can be set up anywhere in a room and be supplied with the appropriate current without unsightly trailing wires.

The distribution boxes for these circuits are readily accessible and the feeders to the distribution boxes are carried in the main vertical service ducts which run from the basement to the top of the building. All switch plugs on the 230-V single-phase system throughout the building are of the same size, 15 A. To protect delicate apparatus requiring small currents, fused plugs are provided.

The main distribution boards are in the basement. They are of the completely enclosed pattern. The board serving the single-phase lighting and experimental systems has its bus-bars divided into two sections. Each section is fed from a separate circuit-breaker in the adjacent sub-station. Links are provided whereby either section can be connected to either source of supply.

The incoming mains are paper insulated, lead-covered, wire-armoured, three-core for the three-phase and four-core for the single-phase lighting and experimental supplies. All secondary and branch circuits are v.i.r. cables run in copper conduit on the "Broduit" system. There are about six miles of copper conduit throughout the building.

Since the conduit was laid while the concrete fabric and floors were being poured, the corrosion-resisting properties of the copper conduit and the water-tightness of the solder-wiped joints proved especially valuable. Spare ways from distribution boxes have been provided with copper conduit leading to and projecting into the nearest main service duct, so that its subsequent connection to any point in the building can easily be made without disturbing any permanent feature.

In the life tests section a special distribution board is provided with a number of wandering plugs, enabling any switch plug in this and adjacent rooms to be connected to the main single-phase supply or to any one of several contactors which are themselves controlled by relays, operated thermostatically, or by any other means that may be desired.

For protracted experiments demanding constant voltage an English Electric auto-induction voltage regulator is provided. The controlled voltage is applied to the primary of a multi-voltage B.E.T. transformer furnished with tappings permitting five-volt steps up to 110 V. This apparatus delivers current varying in voltage by not more than ±0.5 per cent., to a distribution board fitted with fuses and flynut connections.

Circuits for telephones, bells and buzzers are run in semi-circular fibre ducts which have been laid in the concrete floors in every direction in which it was considered they might be useful. The routes of these ducts beneath the wood block floors have been marked and they lead to main service ducts. By these means such circuits can be brought up from the floors immediately below the desk or table that is to be served, so leaving the floors unobstructed by loose wires.

In many of the rooms the lighting switches and fixtures have been so disposed that, in the event of sub-division by partitions, these fixtures will still be in convenient positions for the re-arranged areas. It is believed that the electrical demands of all the research work contemplated in this building can be met without "cutting away and making good" any part of the permanent structure.

Generous use is made throughout of steel sections embedded in the beams, ceilings, and walls into which T-headed bolts can be inserted for carrying motor starters, galvanometer supports, and similar equipment, which can thus be quickly fastened and subsequently removed without damage to the structure.

A "Safety-first" Conference in Manchester

MR. H. ANNIS, of the Metropolitan-Vickers Electrical Co., Ltd., summed up safety-first necessities in factories in an interesting paper which he delivered to a substantial gathering at the National "Safety-First" Association Regional Conference in Manchester on Tuesday last. He deprecated the fact that the average employé was not "safety-minded" enough, and did not read the informative posters which the Association had issued to works for due prominence. He estimated that not 20 per cent. of the men in a factory read these posters, and recommended more "snappy" wording.

Speaking of his own company, Mr. Annis said that lectures which lasted on an average about an hour had been given to over 1,700 juveniles to educate them up to safety-first methods. These lectures were all given in working time and, taking a mercenary outlook, they proved very expensive to the firm. This initial expense would be well repaid if the future workmen in the factory became safety-minded enough to prevent accidents. Mr. Annis emphasised the point that accidents benefited nobody, as they incapacitated the employé, while he was not working, in the way of money as well as health, and cost the employer money in compensation claims and loss of production.

It was apparent that the employer was now much more sincere in his regard for safety-first principles than in past years, and not only carried out the Home Office instructions with regard to adequate machine guards, but also did much more towards promoting safer working conditions.

Men could be classed in various categories as to their carelessness, clumsiness, familiarity with a machine leading to indifference, and physical fitness—some being more susceptible to disease through accidents. He suggested that trade unions should start a continuous drive among their members to promote more enthusiasm for this campaign. Discussing safety first from the foreman's point of view, he mentioned that most foremen had to get jobs completed irrespective of whether safety-first principles were being observed or not.

Mr. W. H. Swann, A.M.I.E.E., H.M. Senior Electrical Inspector of Factories, gave an illuminating paper on "Electrical Hazards," which he illustrated with lantern slides, indicating how fatalities have occurred due to electrical carelessness. The first slide showed the interior of a power station after a 1,000-kW turbo-alternator had burst owing to rigorous balancing tests. Another slide showed how a fatality had occurred through imperfect insulation. Here a workman had been in the habit of keeping a tin can of tea in a warm spot on the top of a large transformer, and while in the act of retrieving his can one day he touched the tape of a conductor with his leg and was killed.

Another menace which was much too prevalent was fire in power stations and works, in which burning oil proved a serious handicap. Mr. Swann said that recently a special committee had been set up for the purpose of studying the cause and means of overcoming this evil. Another matter which Mr. Swann deprecated was the improper use of the main switch-rooms in big works or factories. Invariably unauthorised persons frequented these rooms and left tools about, thus limiting the already limited space in such a room and increasing the risk of accidents. Another slide showed a selection of old-fashioned type fuses where the live wires were left unprotected, and this struck a vivid contrast with present-day switches, which, though nearly fool-proof, still cause accidents when not handled in the correct fashion.

Mr. Swann spoke of the use of electric motors on lifts and hoists, and emphasised the necessity of larger control rooms for lift gear than were fitted on present types. Accidents were often caused through maintenance men not having sufficient room in which to effect repairs in the control-gear boxes. The advisability of frequently checking the over-winding capabilities of lifts was also important in the interests of common safety. In the discussion which followed a point was brought out regarding the depreciation of oil-filled switch-gear after years of use. Mr. Swann said that switchgear did definitely depreciate in degrees of efficiency in so many years, and he said the view held by various consumers that this was not true, and that switchgear manufacturers merely stressed this as a sales point, was entirely erroneous.

The I.E.E. President's Address

THE inaugural address of Mr. H. T. Young as president of the Institution of Electrical Engineers in London on October 22nd commenced with an indication of the growth of the Institution during the reign of the late King. He showed that the total membership had risen from 6,343 in 1910-11 to 16,788 in 1935-36, and the income from £11,722 to £50,672. The expansion of the electrical industry was indicated by the rise in the total amount of energy sold, from 1,027 million kWh in 1910 (Great Britain and Ireland) to 14,692 million kWh in 1935 (Great Britain and Northern Ireland); and in the number of consumers from 300,000 to 7,500,000.

Mr. Young said he hoped that after the issue in 1937 of the eleventh edition of the I.E.E. Wiring Regulations it would be possible to consider the provision of a shorter and simpler set of rules.

The importance of keeping up to the declared voltage was indicated by the fact that in very few instances had advantage been taken of the additional variation (up to 6 per cent.) now permitted by the Commissioners' Regulations. Regarding load balancing, the allowance of a minimum of 15 kW per phase, or per side of a three-wire d.c. system, had made it possible to reduce the cost of installations and services and to improve the safety factor.

The president said that the introduction of 400 V or over into domestic buildings should be subject to the greatest care, and in no circumstances should medium pressure be introduced into a room where there was any possibility of portable apparatus being used on more than one phase. It was not enough to keep socket-outlets 6 ft. apart, or even 20 ft. apart, since vacuum cleaners, in particular, were often fitted with long flexible cords to extend over the whole area of a room.

With regard to cases where heating and cooking equipment was installed on premises where lighting already existed, Mr. Young suggested that if it were necessary to balance phase against phase where the load exceeded 15 kW, fixed apparatus with efficient earthing should be employed on one phase in the room where the second phase was introduced.

The Home Office Regulations under the Factory and Workshop Acts were first issued twenty-eight years ago and a revision would be welcomed by the industry. The separation of generation, transformation and distribution from factory installation and equipment seemed desirable. The Home Office Regulations under the Cinematograph Act were now being revised. The Advisory Committee to the Building Industries National Council was pressing the Minister of Health to replace the varying sets of local building regulations, of which there were over 1,000, by standardised regulations.

Adequate Installations Necessary

The main practical purpose of the address was to draw attention to the importance of providing adequate installations in buildings. The accompanying table was given to show the estimated cost of work and apparatus in old and new buildings (excluding industrial plant) during 1934.

Wires, cables, conduits, wiring, accessories, and labour for installations in all classes of buildings...	£18,065,000
Apparatus, lighting fittings, vacuum cleaners, fans, irons, refrigerators, heaters, cookers, accumulators, signs, and other apparatus ...	9,800,000
Electric lamps (20 volts and over)	5,056,000
G.P.O. telephones—wiring and equipment	1,464,000
Private telephone installations	400,000
Radio apparatus	26,350,000
	£61,135,000
House service meters :	£2,307,000

Mr. Young said that consumers' premises were the bottleneck in the flow of electricity from its source to users' apparatus. This was most pronounced in domestic and commercial buildings, as extensions and alterations in factories were more easily made.

Buildings of all kinds were being erected with little consideration for those electrical and other modern services which must inevitably be required, and their electrical equipment was often inadequate even before they were occupied. No longer was there room to tuck away wires, cables and equipment just anywhere so as to be out of sight. The modern steel and concrete buildings of to-day, when once completed, became almost impregnable fortresses against electrical services. The cost of "cutting away and making good" averaged approximately 10 per cent. of the electrical installation cost. Diversion of this expenditure to cover additional attention to planning and providing the services in the building would represent an appreciable overall saving.

The cost of electrical wiring, equipment, and apparatus, relative to the total cost of buildings—taking all types, including factories—ranged from 1½ per cent. for small cottages to 15 per cent. for cinemas, with an average of 7½ per cent. for houses, flats, and other buildings. This gave an approximate total of £20,000,000 for electrical equipment, in new buildings alone, in 1935. Industrial plant and radio sets were not included in this calculation. There were large stores and hotels in London with annual consumptions of over 5 million kWh each, and none of them could be described as fully equipped electrically.

More Planning Needed

The president emphasised the importance of planning installations concurrently with the planning of a building. Channels, ducts, and conduits for the reception of wires and cables must be considered as an integral part of the building of the future, from the point of intake to the outlets. It was usually beyond the local centres that weakness of planning became most evident. It was just as important to have adequate runs of ducts and conduits from the local distribution centres as from the mains.

In the United States and Canada underfloor duct systems were standard practice in the wiring of nearly every type of building, except private houses. The ducts were made of steel or fibre and were laid in the floor during construction. Mr. Young considered their use essential to adequacy and flexibility. The policy adopted by some supply undertakers of installing mains to flats at no cost to the builder or consumer, as was done from the street to private houses, could be followed with advantage throughout the country.

A closer study of load factor and diversity factor in individual buildings, and the interchange of information obtained throughout the industry, were a necessary step in electrical development. In some cases which he had recently investigated the diversity of these diversities had been pronounced, and in many instances a knowledge of the general facts might lead to a rapid improvement in these factors, particularly in large domestic buildings.

When modern flats included a restaurant it was just as important to install electric cooking in the restaurant kitchen as in the flats. The tendency in these buildings was for the tenants to have meals in the restaurant or delivered to their flats, and electricity's competitors seemed to be well informed about these conditions. As an instance, in one large block of all-electric flats the load could be increased by 500,000 kWh per annum if the restaurant kitchen used electricity.

The planning of telephone installations had now to be done along with that of other electrical services. The General Post Office Engineering Department was collaborating with the Electrical Development Association in producing a comprehensive publication dealing with all electrical services in new buildings.

Radio reception had now become so well established in the life of the community that provision must be made in large buildings, especially blocks of flats, for this comparatively new

service. Already, in a block of flats in London, both sound and television programmes were taken from one central aerial system and distributed by cables to a terminal box in each flat. The estimated total annual consumption of all-mains radio sets was 300 million kWh, equal to twice the estimated load in 1910 for lighting, heating and cooking.

Design of Apparatus

In the design of apparatus there was still much room for improvement. The copying of old forms and shapes had served a useful purpose, but to-day everything should carry with it a sense of fitness. Cookers should now be manufactured in a more pleasing form, and should be combined with other kitchen equipment so as to make up an interesting domestic workshop for the home.

It was essential that manufacturers should make greater use of trained and skilled designers in order to keep pace with other domestic applications. Cumbersome and ugly cast-iron cases were still used for light efficient switch and fuse gear, when they could be equally well housed in pressed-steel cases of one-quarter the weight, with a saving in cost of transport and fixing and a vast improvement in appearance.

Mr. Young exhibited a new motor driven "kitchen waste unit," which would crush and pulverise all garbage and waste from the home and discharge it into the house drain and sewer, thereby dispensing with the antiquated and insanitary dustbin.

To-day something more or something different was required to train men to be, first, electrical engineers, and then to be adaptable to some form of commercial training as well. This was especially necessary for the consumers' engineers in the employ of supply undertakers and for contractors' engineers, who were in continuous contact with the users of electricity and electrical apparatus, and it was on these men that so much would depend in the next decade. The industry could not leave to men with only commercial training the work of advising consumers on the wider and better uses of electricity. The consumer always preferred to discuss his problems with a technical man able to advise him intelligently and he rarely had confidence in anyone else. The problem was important and urgent.

The payment and prospects of the commercial engineer should be made so attractive that the best and most suitable men would be drawn to this section.

The Provision of Domestic Appliances

WHATEVER economists may say about it the fact remains that domestic electrification would not have made such good progress without the assistance of facilities for the hire and hire-purchase of equipment. While this applies particularly to the larger apparatus it is true also, to a certain extent, as regards the smaller items, which, if they had to be bought outright, could seldom find their way into the poorer-class homes.

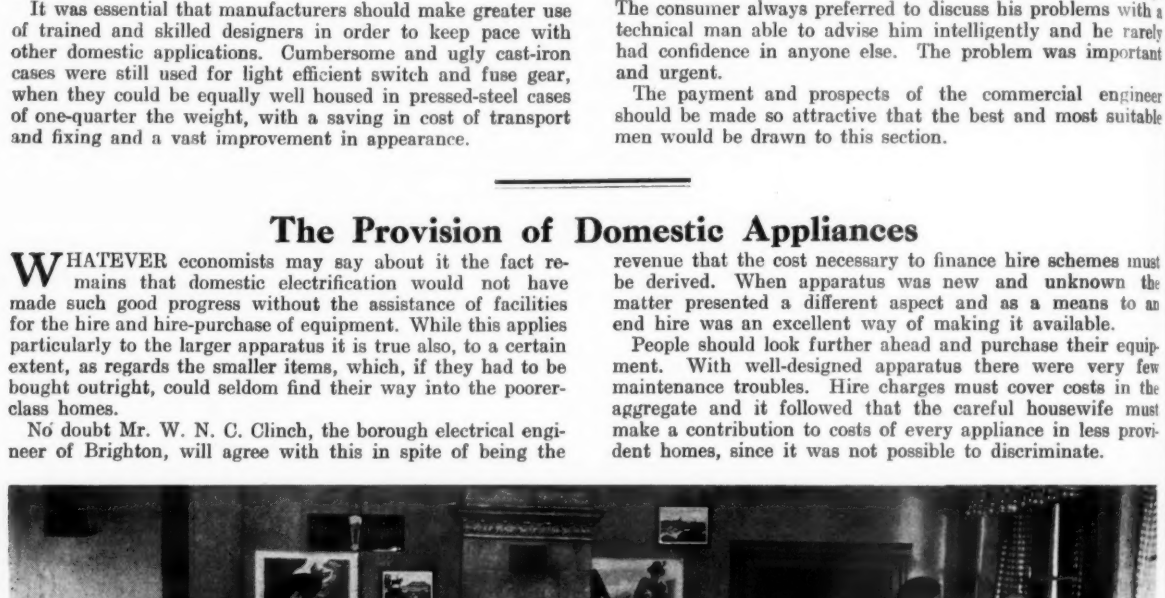
No doubt Mr. W. N. C. Clinch, the borough electrical engineer of Brighton, will agree with this in spite of being the proposer of the motion "That the householder should own and not hire domestic electrical equipment" at a debate held last Tuesday at the headquarters of the Electrical Association for Women, Regent Street.

Pride of possession, said Mr. Clinch, was a governing factor and if hiring was necessary the economic structure of the country was wrong. If apparatus was hired no charge was made for repairs, but people ought to realise by now that they did not get something for nothing. Unlike many other things, domestic apparatus was not required for infrequent use but was an essential feature of the home. At one time the question of reliability was the basic reason for hiring, but this did not apply to-day. He agreed with the view of Miss Haslett that electricity must be used in the best possible way in the home.

Apparatus should be divided into two groups: the heavier equipment such as cookers, water heaters, washing machines, refrigerators, and the lighter, including irons, toasters, fires, &c. The latter class was more often than not bought, but it was fundamentally a fallacy that the only way of obtaining the former was by hiring them. However, he did not say that facilities should not be provided to make the apparatus available.

The life blood of every electricity undertaking was the revenue obtained from its consumers and it was from that revenue that the cost necessary to finance hire schemes must be derived. When apparatus was new and unknown the matter presented a different aspect and as a means to an end hire was an excellent way of making it available.

People should look further ahead and purchase their equipment. With well-designed apparatus there were very few maintenance troubles. Hire charges must cover costs in the aggregate and it followed that the careful housewife must make a contribution to costs of every appliance in less provident homes, since it was not possible to discriminate.



A scene from "Autumn Crocus" presented by the G.E.C. Players at the Fortune Theatre on Monday and Tuesday last **(see page 613)**

Opposing the resolution, Councillor Mrs. Gregory considered that it was wrong to dogmatise. Hire schemes must be available and this did not apply to the poorer classes only. The conscientious housewife did not pay out large sums of money for apparatus about which she knew very little and hire-purchase did lead to ultimate ownership. Outright purchase might be satisfactory where circumstances permitted, but electricity authorities were placing the largest stumbling block in its way by not providing servicing facilities and the rapid obsolescence of apparatus was also a big obstacle.

There was no getting away from the fact that the majority of consumers were not in a position to purchase, and if they were deprived of hire facilities they would be driven to make their purchases in the sixpenny stores. Only the best apparatus was good enough.

Contributions to the discussion were made by Mrs. H. Bentham, Miss Joseph, Mrs. Jackson, Mrs. Goldsmith, Mrs. Miles, Miss Sharp, Mrs. St.John Ervine, Mrs. Rickett, Miss Lockhart, and Mr. A. C. Cramb. To a large extent criticisms were directed towards the lack of servicing facilities available for apparatus purchased and Mr. Cramb suggested that, while it might not be possible for supply authorities to keep spares for every make of apparatus, they might cater for a certain number of makes.

The motion was lost by eleven votes to twenty-three.

The Small Undertakings' Case

The McGowan Report criticised

THE lecture theatre of the Institution of Electrical Engineers was crowded on Friday last week when a conference of small electricity supply authorities was held to protest against the recommendations in the McGowan Report in so far as it discriminated against the smaller authorities. The conference was called at the instance of the Newcastle-under-Lyme Council, and the Mayor—who is also chairman of the Electricity Committee—presided.

The chairman (Alderman S. Myott) opened the conference with an explanation of how it had come about. He said that when Mr. DeRenzi, the borough electrical engineer of Newcastle-under-Lyme went through the McGowan Report he drew the attention of his Committee to the serious position in which the small authorities would be if the recommendations in the Report were acted upon. As a consequence, the Newcastle-under-Lyme Council passed a resolution strongly protesting against the proposal to compulsorily amalgamate smaller undertakings with larger undertakings merely because they were small and irrespective of whether or not they were run in an efficient and up-to-date manner. At the same time the resolution expressed approval of the Report in so far as its recommendations tended to improve the efficiency of distribution.

The next step was for Mr. DeRenzi to call upon the Secretary of the I.M.E.A. to see what was going to be done to safeguard the interests of the smaller undertakings, but as nothing seemed to come of this a meeting was called of chairmen and engineers of small electricity authorities within a convenient distance of Newcastle-under-Lyme, certain companies also being included. After that meeting, the I.M.E.A. was asked, but refused, to supply a copy of the evidence that it presented to the McGowan Committee, and as a result of that refusal it was decided to call the conference, the object being to give representatives of all authorities with outputs of between 1,000,000 and 10,000,000 kWh an opportunity to express their views.

The I.M.E.A.'s Position

The conference lasted for three hours and, as usual at such functions, there was a certain amount of confusion and difference of opinion as to the best procedure to adopt. There were some who were clearly spoiling for a fight and wished to reject the McGowan Report *in toto*, and to leave it at that without any attempt at constructive criticism or proposals. On the other hand there were others who deplored such an attitude and were far-sighted enough to accept a reorganisation of distribution as inevitable. Certain speakers strongly condemned the I.M.E.A., for having, as it was alleged, betrayed the trust which the smaller authorities reposed in them, and, incidentally, Mr. W. Fennell, representing the Mid-Cheshire Electricity Supply Co., expressed the view that the small companies felt that their Association had "let them down" as the I.M.E.A. had let down the small municipal electricity supply authorities. This condemnation of the I.M.E.A., however, was, so to speak, nipped in the bud by Mr. Price F. White (electrical engineer, Bangor), who pointed out that as the action of the I.M.E.A. was not on the agenda the conference ought not to discuss it. He added that it was always open for the members of the I.M.E.A., who felt dissatisfied, to call a special general meeting of that body. On this, the chairman asked that this particular aspect should not be referred to again, although he himself had expressed strong criticism of the I.M.E.A. in his opening remarks. From a delegate representing a number of South Wales authorities came the suggestion that the I.M.E.A. should be asked to call a special meeting to discuss the whole matter but no action in that direction was taken.

The central issue before the conference was the recommendation in the McGowan Report that small undertakings with an output not exceeding 10,000,000 kWh per annum should be absorbed into larger undertakings and those responsible for some of the smaller undertakings were particularly bitter at the suggestion in the Report that such undertakings, because they were small, must necessarily be inefficient. Cases were mentioned in which small undertakings were supplying electricity at cheaper rates than the large power companies and the large municipalities, and indignation was expressed at the implication that the larger undertakings had a monopoly of the brains and energy in the electricity supply industry.

Certain resolutions had been formulated for presentation to the conference but they were modified before the conclusion. For instance, the first resolution expressed approval of the latter part of paragraph 130 which states: "We feel strongly that it would neither be equitable nor practicable to prescribe what particular undertakings or even what particular size of undertaking should be amalgamated under such a scheme until after a survey which has taken into account the circumstances of each undertaking has been made." The resolution also suggested that certain parts of the Report should be eliminated. So far as the first part of this resolution was concerned, strong objection was taken to implying that the conference approved any part of the Report, and as to the suggestion to eliminate parts of the Report, it was pointed out that a conference of this sort could not ask that parts of a Report already before Parliament should be eliminated. This resulted in a revision of the resolution on totally different lines.

Again, there was strong criticism of the proposal in the McGowan Report that the District Commissioners should be appointed by the Electricity Commissioners, the view expressed being that in such an event the smaller undertakings would be hanged before they were tried.

As will be gathered, and imagined, the views expressed were emphatic but there was a leavening of what might be termed the more cautious, and even Mr. J. H. Warren, the Town Clerk of Newton-in-Makerfield, who has been advising the preliminary committee on legal matters warned those who wished to reject the report *in toto* what a strong case could be made out for the amalgamation of distribution areas. He also expressed the view that the I.M.E.A had not betrayed the the smaller undertakings if the evidence was carefully read.

The result of the conference was the passing of the following resolutions:—

1. That strong objection be taken to the unjustifiable and inconsistent differentiation made in the McGowan Report against undertakings with an output which does not exceed ten million units per annum.

That this conference views with alarm the implications of the McGowan Report and pledges itself to uphold the rights of the smaller undertakings; that a representative committee be appointed from this conference to organise the smaller undertakings and that each undertaking be asked to subscribe to the expenses that may be incurred.

2. It is essential that all undertakings should obtain their bulk supply at a uniform price if they are expected to sell at uniform tariffs.

3. (a) In the interests of the development and expansion of the distribution side of the industry, it is essential that the identity of all efficient existing undertakings should be retained and there should be a local inquiry to determine efficiency or inefficiency.

(b) That the Electricity Commissioners be requested to issue a statement setting out clearly the defects which in their opinion at present exist in the distribution side of the industry and the standard which they consider should be attained, as the proposals of the McGowan Committee merely leave the industry in the hands of a reduced number of undertakings but make no provision for ensuring any uniformity in tariffs or in the facilities offered to the public.

The selection of the members of the proposed committee is to be made on a regional basis.

Women's Electrical Activities

SPEAKING at the fourth business hour luncheon of the Electrical Association for Women at the Prince's Restaurant, Piccadilly, on October 22nd, Miss E. A. Jones, headmistress of the County Secondary School, Clapham, said that a good many of the troubles of to-day were due to the fact that we had produced a number of wonderful inventions which we had not yet learnt to employ properly. Many people were still playing with electrical gadgets, and it was in the protection of these that the E.A.W. was doing such good work. One of the most interesting developments of the Association's activities was the training of girls in domestic housecraft. A vote of thanks to Miss Jones was proposed by Mr. F. S. Button, J.P., member of the E.A W. Council. The luncheon was presided over by Miss L Broad, headmistress of the Tollington High School, which was the first to be affiliated to the E.A.W.

The first meeting of the Kent County Group was held at Ashford on October 22nd, when about a hundred members from the constituent branches met at the Masonic Hall. A discussion on branch matters was opened by a speech of welcome by the Ashford president, Mrs. Burrows, and Mrs. Tatchell (representative of the South-East England National Executive) issued an invitation to the group to hold its second meeting in Gravesend next March. Following luncheon the party proceeded to Wye, where some visited Wye College and the remainder went over Stonegate Egg Packing Factory. They met for tea at the Wye Women's Institute, where they were joined by Miss Caroline Haslett, who spoke of her experience in America.

An Ayrshire Branch of the Association was inaugurated at the Town Hall, Ayr, on October 14th.

On account of the Coronation the Association's Annual Conference at Bristol next year is to be held earlier, from April 7th to 9th. The date of the annual ball has been fixed for Friday, April 30th, at the Park Lane Hotel, Piccadilly, London, W.1.

Meetings and Discussions

This week's selection from the proceedings of electrical and allied associations includes two I.E.E. Centre chairmen's addresses. Mr. G. L. Porter (North-Western) deals with the early days of electricity supply on the North-East Coast, while Mr. H. C. Babb utilises his experience of rural electrification in Scotland as the basis of his address. At a recent conference of the Chemical Engineering Group there was a symposium on the use of automatic regulators in the chemical industry; we reproduce the salient points from the papers presented. Other subjects covered this week are the prevention of grit emission and the construction and employment of cathode-ray oscillographs.

Lessons from the North-East Coast

EARLY development of a pioneer system of power supply (that of the original Newcastle-on-Tyne Electric Supply Co., Ltd.) formed the subject of an inaugural address of Mr. G. L. Porter at Manchester on October 20th, as chairman of the North-Western Centre of the Institution of Electrical Engineers.

Remarking that the nature of the area deserved some consideration, as it had a profound effect on the subsequent development of the system, Mr. Porter said that ship-building and coal-mining were the two most important industries. The former was one in which electrification was easily justified, whereas in the latter it was very difficult for a public supply undertaking to compete with private plant. Both formed a spread-out load. A peculiarity of the area was the extensive use of waste heat (gas and steam) particularly from coke ovens.

Three of the major problems encountered concerned system protection, communication and regulation, and there was something particularly convincing about knowledge gained from trial and error. Incidentally the term "transient" was not at that time in the engineer's vocabulary, although the word "surge" had already become familiar as an excuse for cable breakdowns.

At the commencement of high-voltage distribution the charge engineer at the main power station was also the system control engineer, but before long it was found necessary to separate these duties. In addition to the telephone and the system diagram which showed the positions of all switches and isolators, summation instruments showing the voltages and loads on each of the two main coal-fired stations were installed. There was also a synchroscope permanently connected between those stations. To give an indication of the total load on a station at a point approximately ten miles away, through 20 lb. telephone conductors, was rather an achievement in those days, and was due to the initiative of Mr. E. Fawsett in developing a suggestion of Lincoln's into practical apparatus.

On a large system protective gear and load despatching were intimately related, and as it was not feasible to alter the sectioning of the system hour by hour to suit the relative amounts of plant running in the various stations, it was quite likely that considerations of system sectioning would dictate the minimum amount of plant to be run in the less efficient stations. The chief problem was not really a technical one, but consisted of the usual difficulty in placing a cash value upon continuity of supply.

When real emergencies arose, it added greatly to the rapidity with which the control engineer could size up the situation and decide upon the best course to follow if he was familiar with the station at which the trouble had occurred. Control engineers should therefore be given facilities for gaining the necessary knowledge, and this again was helped if sub-station layouts were standardised as far as possible. The running of up to fifteen power stations in parallel introduced no special difficulty beyond those connected with system sectioning.

The use of so much waste heat decreased the load factor on the coal-fired stations, reducing to some extent their thermal efficiency and making regulation of all kinds more difficult. The nearer a regulator was to the consumer, the more effective it would be. A voltage variation of more than ± 4 per cent. was not really satisfactory; that figure meant that if the sub-station bus-bar voltage could be maintained at + 4 per cent. at maximum load, then 8 per cent. drop was allowable to the farthest consumer. If, however, the high voltage system was subject to a drop of 4 per cent., only half the previous drop would be allowable in the low voltage mains, and either much larger and more costly cables, or many more sub-stations, would be required. The cost of either of these alternatives would be greater than the cost of providing on-load tap changing or other means of regulation at the sub-station. Some authorities were of the opinion that the additional revenue gained as a result of the higher average voltage at consumers' terminals would itself pay the capital charges on the regulating apparatus.

With regard to neutral earthing, it was sometimes stated that the maximum value of earthing resistance allowable was determined by the fault current necessary to operate the protective gear. This was probably correct for a wholly underground system, but when overhead lines were used a much smaller resistance was desirable. When fog or other cause reduced the flash-over voltage to a dangerously low value it was essential that the neutral should be sufficiently anchored to the earth potential, otherwise a flash-over on one phase would be likely to produce a flash-over on one or both of the others, possibly on the duplicate line to that on which the original fault occurred.

Experiences on the North-East Coast and in Scottish rural districts

Rural Electrification in Scotland

OF the fifty-eight undertakings supplying electricity in Scotland, no fewer than forty-six are confined to urban areas with a population density averaging 7,500 per sq. mile. These cover just over one per cent. of the 29,800 sq. miles of the country. Of the remainder about 58 per cent. (with a population density of 88 per sq. mile) is served by three county councils or local electricity boards and nine companies, at least one-quarter of whose areas is mountain and heathland. In spite of this, as Mr. H. C. Babb stated in his chairman's address to the Scottish Centre of the Institution of Electrical Engineers on October 27th, electrification is quite practicable as most of this rural population lives in small communities.

In the interests of economy he considers that the height of high-voltage lines across country need not generally be greater than that specified for low voltage, and he criticises the restriction of the minimum multi-phase load to 15 kW. He advocates the policy of requiring a guaranteed annual consumption of electricity for, say, five years, rather than a capital contribution towards service costs, which causes prospective consumers to await the connection of others to the system in order to reduce the individual proportion.

Small holdings are tending to increase, and the consumption of electricity for these averages 34 kWh per acre against 9 kWh for farms. Capital expenditure, however, averages 68s. per acre instead of 6s. 9d., and revenue is only 13 per cent. of capital expenditure compared with 33 per cent. The position is likely to improve with the development of the domestic load in small holdings, as is evidenced by increases up to 15 per cent. in revenue in the fourth year in some cases. If every cow in Scotland were milked electrically the consumption for the purpose would be about 11 million kWh per annum, but for the provision of capital Mr. Babb looks to the Board of Agriculture, with the assistance of the undertakings in the form of hire and hire-purchase schemes.

For distribution single-phase lines capable of later conversion to three-phase are advocated, but it is pointed out that a cable, although costing two and a half times as much as overhead construction, has a life of about five times that of an overhead line and involves lower maintenance costs. Interlocking metal tiles are now available that enable cable to be safely laid a few inches from the surface, but trenches 18 in. deep can be quickly made by tractor-driven excavators. Three-core unarmoured screened "H"-type 11-kV cables are available at a cost per mile for 0.016 sq. in. of £234 and for 0.05 sq. in. of £340.

The majority of the sectionalising points should be non-automatic, high-rupturing capacity switches being installed at a few main points. An earth wire placed above the line conductors has reduced the lighting troubles on the system of the Lothians Electric Power Co., and a further effective precaution is the use of "spill-over" insulators of low flash-over values at easily accessible points on the line. An alternative method is described which consists of a gap giving a small time-lag to steep-fronted impulses in series with a cross-jet pot oil circuit-breaker. The latter opens, it is claimed, within 0.04 sec. on a 33-kV line if a power arc follows a flash-over, thus dissipating the surge energy before the protective gear has time to operate.

A reliable watertight overhead lead-in for a low-voltage service can be effected by plumbing a copper inverted "J"

tube to a short piece of lead which takes the place of a roof slate; the insulation of the wires should not be v.i.r., but should possess better damp- and corrosion-proof properties. Unless a very low earth resistance is obtainable earth-leakage trips should be used on installations to which cookers or other heavy-current apparatus are connected.

Cathode-ray Oscillography

AT the opening meeting of the 1936-37 session of the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on October 20th, Mr. G. Parr, of the Edison Swan Co., gave an address on the cathode-ray tube and its applications. Of the various types he was only able to deal in detail with the medium-voltage portable tube for observational work. After discussing the various methods of focusing the beam Mr. Parr gave it as his opinion that the gas-focused type would be superseded by the vacuum type of tube for all but investigations for which an a.c. source was not available.

The advantages of the electron focused tube were particularly appreciated in high-frequency and radio-engineering practice. The use of the tube as a phase indicator and power measurer was explained and demonstrated on a portable equipment, and it was shown that in the measurement of dielectric losses in insulators the area of the elliptical figure formed on the screen was proportional to the power loss in the dielectric. As the tube imposed a negligible load on the circuit there was no necessity to compensate for the power absorbed in the measuring apparatus, and the accuracy was such that a phase error of 1 deg. was easily discernible.

For the observation of wave-forms of machines and circuits a form of linear time scale was essential and the lecturer showed how this was developed from a condenser-resistance charge and discharge circuit. The method of synchronising the wave to the time scale to produce a stationary figure was demonstrated with the effects produced by excessive synchronising and non-linearity of scale.

In dealing with the general applications of the tube to industry, its wide versatility was shown by a number of typical circuits and the results obtained. The measurement of explosion pressures in engine cylinders was made possible by the conversion of mechanical pressure into e.m.f. by a piezo-electric device. The use of the tube in medical work was also mentioned—as a recorder of the heart's e.m.f. and the action currents which passed through the nervous system. During the discussion further applications were mentioned, and in particular the work of the Radio Research Board in the use of the tube as a direction finder and automatic compass. The lecture was illustrated by numerous lantern slides and a practical demonstration was given of the points made by means of a portable experimental equipment.

Preventing Grit Emission

AT the recent eighth annual conference of the NATIONAL SMOKE ABATEMENT SOCIETY, Messrs. A. T. Barber and T. F. Hurley presented a paper reviewing "Methods for the Prevention of Grit and Dust Emission," especially from pulverised fuel furnaces. The authors show that the nature and amount of dust in boiler gases varies with the design of furnace, draught, load and characteristics of the coal.

Among coals of equal ash content that having ash of higher fusion point will produce the more dust, as ash of a lower fusion point remains on the grate as clinker. Cleaned coal reduces the amount of ash and often of sulphur present, and the price margin between clean and dirty coal is diminishing. It is suggested that the expense of providing and maintaining dust-collecting apparatus may sometimes be obviated by burning more expensive cleaned coal at a lower overall cost.

The principle properties affecting collection are size, density, wetting, ionisation. The settling rate (which is proportional to the square of the lineal dimensions and the density of the particles) determines the degree of nuisance caused, and a domestic chimney may be worse than a tall factory shaft.

The three methods of dry collection, *viz.*, settling chambers, centrifugal and electrostatic, are described with diagrams. The first is regarded as practicable only for dealing with large dense particles in very small installations. In the second, the size of the collecting apparatus is reduced by increasing the velocity with which the particles cross the stream lines of the gas. This type is subject to limitations as regards minimum size of particle and maximum size of unit and velocity.

The electrostatic precipitator will remove small particles as easily as large. Ionic discharge between the high-voltage negative and earthed positive electrodes causes the dust to become charged and discharged. Power and maintenance costs are low, but the capital cost is high and considerable space is occupied. Like most dry systems the temperature drop through the plant is low and does not affect chimney draught.

Wet types have the advantage of acting as sulphur removers. Both spray effluent and film non-effluent types are described. As dust removers only, the large amount of water required to wet the dust thoroughly and the removal of solids from the liquid make such systems costly to install and maintain.

The efficiency of dust-collecting plant is difficult to measure and a committee of the British Standards Institution is experimenting in this connection.

Automatic Regulators in the Chemical Industry

A CONFERENCE on automatic regulators as used in the chemical industry was held in London on October 15th and 16th by the Chemical Engineering Group of the SOCIETY OF CHEMICAL INDUSTRY.

The influx of telephone work to the General Post Office has necessitated the engagement of additional men who are being given intensive training. Our picture shows a training school at Trafford Park, Manchester, where men are taught methods of telephone installation

Among the papers submitted, that by Mr. A. D. E. Lauchlan (Cambridge Instrument Co., Ltd.) deals with electrical control of chemical processes. Following a résumé of hydrogen ion activity, the more suitable forms of potentiometer electrodes for the measurement of the pH value are described. The hydrogen electrode is the more accurate under most conditions, but for various reasons has fallen out of favour. The quinhydrone electrode is extremely popular and simple to use, but cannot be employed for solutions of pH greater than 7.5.

Both these types can be correct to 0.02 pH. The antimony electrode is not quite so accurate, but promises to be even more popular than either of the other two since it can be used over a range from 2 to 13 pH, is not easily "poisoned" and needs little attention. For greater accuracy temperature control of the electrode system is essential and is equally necessary for manually operated potentiometer outfits as for electrical automatic control with recorders actuating motor driven valves. Glass electrode installations require thermionic valve amplifiers.

Control of the pH value of a liquid by adding a reagent is employed extensively, whereas process control by conductivity has not advanced so far, largely due to lack of suitable apparatus for testing and rather greater technical difficulties. A modified form of Wheatstone bridge is employed, arranged to operate at about 800-1,000 cycles p.s. By making the closed reference cell of the same dimensions as the open measuring cell and immersing both in the bath to be measured, change of conductance due to change of temperature can be made to affect both electrode cells equally, so reducing the error to zero.

A paper by Dr. Ezer Griffiths describes simple forms of automatic regulators of temperature pressure, voltage and humidity that are employed at the National Physical Laboratory. No special novelty is claimed for them, but the author

points out that the savings that can be effected by the industrial uses of such devices would often justify a large initial outlay on the development of suitable control gear.

Other automatic appliances referred to are a starting device for oil circulating pumps, a cut-out operated by the level of a liquid, and an air speed controller for wind tunnels.

The installation factor in automatic controls is discussed in a paper by Mr. D. Harrison (Negretti & Zambra, Ltd.) who states that troubles due to errors in installation or fitting probably exceed those due to bad design or wrong choice of type.

Messrs. A. Callender and A. B. Stevenson (I.C.I. Alkali, Ltd.) point out that in the chemical industry automatic control is not only desirable to save labour, but also often vitally necessary to the attainment of optimum purity of the final product. But in the majority of cases the controlling influence is not linear with movement of the correcting device. Also automatic control should, without excessive movement or rapidity of working, be able to stop fluctuation before it has developed to more than twice its initial inevitable value, and subsequently to damp the oscillation to a comparatively small value in not more than two complete cycles.

A general study of these problems has enabled the authors to devise a system that is essentially simple and yet applicable to every problem of control, whether involving time-lag or not. A full account of the mathematical treatment has been published elsewhere and the present paper describes mechanical and electrical analogues in some detail.

A paper by Mr. B. T. Wingfield (Drayton Regulator and Instrument Co., Ltd.) deals with applications and limitations of self-operating temperature regulators, vapour tension type.

A paper by Mr. W. J. A. Copeland (Lovick, Johnson Co.) is concerned with instruments for automatically controlling temperature, pressure and flow. He states that for temperatures above 300 deg. F. resistance thermometers are being replaced by thermocouples, which are cheaper and less subject to contamination. Below 300 deg. F. greater accuracy is obtainable with nickel resistance thermometers. Thermo-electric pyrometers are used more widely than any other type; the potentiometer types are now coming into prominence, having a wider chart and greater accuracy. The sensitivity of photo-electric pyrometers for measuring the temperatures of hot moving bodies is so great that they respond to a change of temperature in less than 0.5 second for the full scale. The advantage of the electrical flow meter over the mechanical type is that it can afford remote indication.

Gas analysis apparatus is available with "floating" or "throttling" controllers for electrically actuating the valves, with "anticipating motion" that produces practically straight line results.

Dr. W. A. Clark (I.C.I. Fertiliser & Synthetic Products, Ltd.) describes the extent to which automatic control has been applied to the Billingham factory processes, indicating the gradual evolution of policy and degree of practical necessity. He has had little experience of electrically operated controllers.

A paper by Dr. A. Ivanoff (George Kent, Ltd.) shows how the characteristics of the plant to be controlled influence the performance of an automatic temperature controller. He concludes that theoretical development of automatic regulation is unlikely to undergo great changes in the near future. Therefore if improved results are desired, more attention must be turned to the plant it is desired to control.

Messrs. L. B. Lambert and H. R. Walton (Electroflo Meters Co., Ltd.) stress means of control as a factor in plant design. Hitherto the process itself has had first consideration, whereas the authors contend that the control of the process is equally essential. The controllability of plant has not received any particular attention. Instruments and regulators are regarded as auxiliaries, and many of them do not operate at maximum efficiency simply because their addition was not foreseen, so resulting in unsatisfactory compromise.

Messrs. E. I. Lowe and J. Frisken (National Smelting Co.) detail their operating and maintenance experience of Kent draught controllers, Foster and Cambridge temperature control gear (with notes on recorders and thermocouples), Electroflo CO_2 meters, and Cambridge SO_2 meters.

Physical Society Papers

AMONG the papers submitted at the October 23rd meeting in London of the PHYSICAL SOCIETY was one by Mr. J. C. C. Conybeare, in which he shows that the variation of electrical resistance with temperature of palladium and palladium-gold alloys resembles that of constantan for compositions up to about 60 atoms per cent. of gold, at which point there is a change-over to the normal type of resistance curve. His results are in agreement with the quantum-mechanical theory of conductivity as applied by Mott to the transition of metals.

A paper by Mr. V. J. Jehu deals with the electrical conductivity of barium chloride and its variation with temperature, a formula being given for connecting conductivity and temperature.

Messrs. J. S. Preston and F. W. Cuckow describe a photo-electric spectrophotometer of high accuracy which is claimed as a whole to have a linear response over the necessary range of photo currents.

Messrs. F. T. Farmer and J. A. Ratcliffe deal with wireless waves reflected from the ionosphere at oblique incidence. They have studied the variation of equivalent path with emitted frequency for waves of such a frequency that they nearly penetrated the F region. The results agreed qualitatively with a simplified theory, and under certain conditions showed the possibility of two transmission paths to the distant point. A quantitative discrepancy between the simple theory and experiment was noticed and its possible explanations are discussed. It is shown that by comparing the frequencies which just penetrate the E region at normal and oblique incidence it might be possible to decide whether the Lorentz polarization term should be included in calculating the force on an electron in the ionosphere. Measurement of the sunrise increase of absorption for waves received at the two points indicated that the day-time absorption takes place in a region below the main deviating portion of the E region, for echoes both from the E and from the F regions.

Messrs. S. H. W. H. Falloon and F. T. Farmer describe a circuit evolved for producing in a cathode-ray oscillograph a time base suitable for the investigation of wireless pulses reflected from the ionosphere when no ground wave is present. The time base is locked to the received groups of echoes and gives a stationary pattern on the oscillograph, even when all the echoes are fading considerably. The whole group of echoes, including the first, is delineated on a portion of the time base which is not obscured by end effects in the trace, so that accurate measurements of time intervals can be made.

The Decline of Tramways.—In the course of a lecture on "Road Transport Statistics," before the INSTITUTE OF TRANSPORT on Monday last, Mr. A. E. Kirkus said that during the past eleven years the number of tramway undertakings had declined from 235 to 98 and the total route-mileage from 2,624 to 1,620. Although many tramcars had been replaced by trolley buses, many had given way to petrol omnibuses, which was to be regretted from the fuel point of view; they used imported oil instead of power generated by British coal.

A Swiss Hydro-electric Scheme

THE hydro-electric plant recently completed at Chandoline, near Sion, Switzerland, by the Dixence Co. is capable of producing 133,250 kW, due to the high head, although the flow is only 2,256 gal. per sec. The dam at Motot, a little over ten miles from the plant, is of the gravity type and is designed to give a utilisable supply of 11,000 million gal. between the top of the dam and the top of the water inlet. Including 1,100 million gal. which enters the basin in winter, the reservoir will contain sufficient water for the production of some 200 million kWh.

From the dam a canal in the form of a concrete gallery (reinforced in places) with an internal diameter of 7 ft. 5 in. and an even drop of 0.2 per cent. runs for about 7.2 miles, when the construction changes to steel conduit of 6 ft. 6¾ in. internal diameter with a slope of 1 per cent., an open vent being provided at the junction. This section, about 437 yd. long, terminates in the sluice chamber, from which two steel pipe lines run for 3.4 miles to the power plant. The drop in hydraulic pressure from the intake at the reservoir to the sluice gates at zero output is from 202,000 ft. to 292 ft. of water.

Joints in this pipe line are electrically welded. The fall from the level of the sluice gates to that of the turbines is 5538.8 ft., and the gross head is 5740.8 ft. The gallery and the pipe lines are designed for an output of 2,256 gal. per sec., giving at mean net head 59.19 kWh per gal. per sec. at the terminals of the step-up transformers.

The plant when completed will include five main groups (one as stand-by) and one auxiliary group of generators. Each main group comprises a 30,000-kVA 13-kV 50-cycle alternator driven by two 21,250-h.p. single-jet Pelton turbines mounted one at each end of the shaft. The auxiliary group is similar in design, but is rated at 7,000 kVA. Each group is connected to a three-winding step-up transformer, the secondary of which will feed the 65-kV transmission system of the Dixence Co. and the tertiary the 130-kV system of the Energie de l'Ouest Suisse Co. Pictures appear on the opposite page.

Correspondence

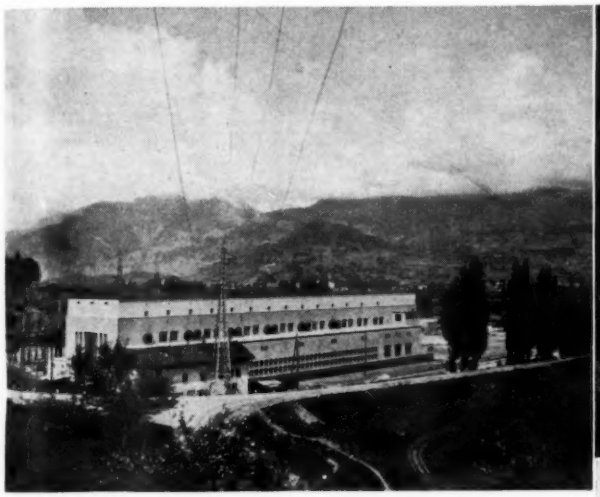
Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

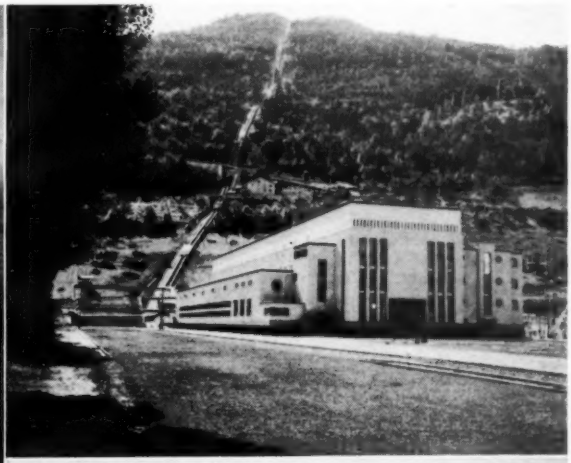
The Problem of Design

I regret that "Designer" has interpreted my letter as a personal "knock" at himself and his colleagues, and I should like to take the opportunity of stating that this was not so—my sympathies are with him and his fellow designers—for the real cause of the stereotyped and inefficient designs of many electrical appliances lies with the manufacturer.

Although a designer may have the foresight and courage to plan and design efficient domestic appliances that are distinctly original in shape and method, he is prevented from putting his ideas into useful practice by the shortsighted "follow my leader" attitude of the producer. There is too much of the "what was good enough for father is good enough for us" air about the styles of domestic utensils and appliances, and, what is more important, a general lack of knowledge of the public's needs and the public's purse.

Too many manufacturers endeavour to impose on the public the styles and designs which they *think* the public ought to like, in happy ignorance of the fact that the public buys only what it wants.





A Swiss Hydro-electric Scheme (see opposite page)

1. The Dixence power plant. 2. Another view of the plant showing the pipe line. 3. The Dixence dam from downstream

The modern house has set a serious problem for the designer and manufacturer of domestic appliances and fittings to solve and to-day the problem of design for purpose is a vital one. Although not employed as a designer, I have taken more than a passing interest in this question of design for some years, and have followed the work of such men as Henry Dreyfus Le Corbusier, Walter Dorwin Teague, Peter Behrens and Raymond McGrath, to mention a few, who have fearlessly expounded in practice what many are only able to do in theory.

A few manufacturers have been bold enough to cast convention to the winds and strike out with something different in style yet efficient in practice, but many still jog along their own narrow little paths, forgetting that the public is being educated by various means and methods, and is daily growing more appreciative of fitness for purpose. At present the products so designed are at a price only within reach of those who can afford them, and the public, who have appreciated the advantages of these better things and have made comparisons, also want them, but at a price within their reach, and the electrical industry must be prepared to give itself a good dusting and face this vital issue.

Harborne, Birmingham, *October 14th.* D. Mills.

The I.E.E. and Lighting

Mention was made in the presidential address to the Institution of Electrical Engineers of the good work carried out by the various sections. It seems rather strange that so little attention is paid by the Institution to the question of lighting. This is a subject which is growing rapidly in importance yet, in spite of this, very few lighting papers are read before the Institution. I should like to suggest that it is high time that the I.E.E. considered the forming of a section devoted to the subject, and in view of the fact that this year's President is actively connected with the subject, the present is extremely opportune.

I am quite aware of the good work carried out by the Illuminating Engineering Society, but suggest that the proposed section could be arranged to function so as not to cause overlapping. Such a project would bring illuminating engineers into closer contact with specialists in other branches of electrical engineering to which lighting is closely allied, thus benefiting the industry as a whole. Lighting Engineer.

October 24th.

Engineering Education

The article by Professor C. L. Fortescue on the above subject, which appeared in your issue of October 16th, is a very controversial one. Professor Fortescue appears to think that during our training, which takes place during our most impressionable years, we ought to apply ourselves more closely to our work. I think, however, that there is need for a broader culture amongst engineers. Many of them have no thoughts beyond their work, and that is due to their early training. When such men retire, if they ever live to retire, they will be full of regret.

After all, our work is not the be-all and end-all of our lives. We ought to have leisure to study, while we are young, art, music, physical culture, poetry, &c., so that we may live a fuller life. In the past, engineering works have been run by "hard-headed business men" who have seemed unable to correlate production and distribution. The engineer should have a chance at running his own business, and to that end he ought to have time for studying the business side of the works.

Professor Fortescue considers that mechanical engineering bulks too largely in electrical training, but I maintain that it is the basis of all electrical engineering, and there are many electrical engineers to-day who owe their present positions to an early mechanical training. Without good mechanical knowledge the electrical engineer will become a mere wireman or electrician.

Professor Fortescue states that "Routine work of any kind is almost useless," but where can the average engineer go to-day where routine is not prevalent? Lucky is the man who finds himself able to get beyond routine work in his 'twenties, or even 'thirties. It is only after many years of exacting toil, and for a few, that relief from routine comes. In all the large manufacturing companies even the estimating and design departments are subdivided into more or less watertight compartments and it is possible to do the same type of work for years. It is only in small companies that there is a chance of change and few young engineers wish to train in a small firm.

I think that the best lines on which training can be based are two years in a mechanical engineering shop, handling the tools of the trade as manual skill *is* essential; after that a "sandwich" course with any of the universities and an electrical company learning machine building, armature winding, and testing. This will bring the student to his diploma, and after passing out from college he will be fitted to take a junior position in the design office, and this should be followed by eighteen months in the estimating or contract department.

The young engineer should then shift his locus and leave the company with which he has received his practical training if there is nothing suitable for him there. I admit that during the past few years if a man has had a job he has been glad to stick to it; but we hope those days are now passing.

With such a training as I have outlined an engineer should be able to hold any job he applies for and obtains.

D. Maclaren Cathcart, B.Sc., A.M.I.E.E.

Saltcoats, Ayrshire, *October 19th.*

Distribution Losses

Referring to the article "Distribution Losses" in your issue of October 16th, one must be careful in making comparisons to divide the quantity (I^2) mean $\times R$ by I average. This puts both on the same basis of loss per unit load. It is sometimes instructive to study the I R curve, *i.e.*, the load-curve to scale, which gives the loss per unit load at any given time, thus one can note the efficiency of transmission at particular periods.

Mr. Preston's statement that "the cost of kWh lost is in many cases greater than that of kWh usefully employed" requires examination. Surely if the method of charging is equitable the cost of the kWh sold includes that of the units lost, and it would have been better to have said that the kWh lost were greater than those sold. This statement qualifies the general one that "the efficiency of a distribution line is a maximum at minimum load and decreases as the load increases." As a matter of fact in a feeder having reactance the maximum efficiency is when $\frac{kI_{r.m.s.}}{\cos\phi}$ is a minimum, and is zero at the fixed loss value of I and at I approaching infinity. Apart from consumers' bad power factors it is these fixed losses which give rise to the conditions mentioned.

When our mathematics touches upon costs it seems to come unstrung; take, for instance, Kelvin's law for feeders. How shall we arrive at the average cost per kWh lost? One extreme would be to charge generation cost only. A little thought will show that the loss curves must be costed exactly in the same way as any other load in respect of maximum demand, diversity factor, and running charges on the lines indicated in my article which appeared in your issue of September 25th.

B. Lloyd Price.

Newport, Mon. *October 26th.*

Salaries of Chief Engineers

The disgracefully low salary advertised by the Stafford Corporation for the position of engineer and manager makes it evident that some method of protection will have to be organised by the chief engineers, and I suggest that it should be done on the lines of the N.J.B., which is recognised by the Ministry of Labour as the appropriate body for regulating salaries and conditions of employment for the technical staff.

The Walker Scale has been negotiated and is being paid by a large number of undertakings, whilst others pay salaries in excess of that scale. But the important factor is that it exists, and if a responsible body consisting of representatives of the employers and the chief engineers can be organised, there should be no difficulty in getting the Ministry of Labour to follow the same course as was taken when the N.J.B. was formed.

I suggest that for the employers' side the municipal members of the N.J.B. might be acceptable. They would have to be specifically elected for the extra duty at the annual meetings of the municipal undertakings, whilst the other side would be appointed by the Associated Municipal Electrical Engineers. The additional work should not be great, nor many meetings necessary.

There has always been a rooted and probably justified objection by the municipal undertakings to their chief engineers being members of the E.P.E.A. because they have to make recommendations to the committee regarding promotion of staff, and to take disciplinary action when necessary, but they are being driven to such membership by the policy of undertakings like Stafford.

W. Walker.

Stockport, *October 20th.*

The Modern Street Lighting Problem

I have been interested recently in making a study of the running costs of lighting by various sizes and types of lamp—incandescent gas-filled, mercury vapour and sodium vapour, and have drawn two conclusions: (1) Whatever type of lamp is used, the largest unit is the cheapest to run. (2) The order of economic merit is sodium-vapour, mercury-vapour, incandescent.

If we take a time period of 4,000 hours and a kWh price of 1d., the relation between the costs will approximate to the values given in table 1. (For arithmetical convenience the cost by 60-W incandescent gas-filled lamps has been taken as 10 money units.) In the ratios with gear it is taken that the lamps are used for 4,000 hours in each year and the gear is written off in ten years.

I am satisfied by practical demonstration that street lighting and much industrial lighting can be effected with equal visual efficiency by a quantity of monochromatic yellow light

TABLE 1.

Incandescent.		Mercury.		Sodium.		
Size.	Cost.	Size.	Cost.	Size.	Cost.	
60 W	10	150 W	5.4	65 W	4.19	— Less
100 W	7.22	250 W	3.46	150 W	2.79	— gear
200 W	6.15	150 W	5.76	65 W	4.53	— With
500 W	4.33	250 W	3.57	150 W	2.96	— gear

TABLE 2.

Type.	Size.	Cost.	Type.	Size.	Cost.
I.	60 W	10	S.	150 W	1.97*
S.	65 W	3.02	I.	200 W	6.15
I.	100 W	7.22	M.	250 W	3.57*
M.	150 W	5.76	I.	500 W	4.33*

* These three are of approximately equivalent light output per lamp.

equal to not more than two-thirds the quantity required of incandescent or mercury light. Thus to get an efficiency-cost ratio, the figures for yellow sodium light must be multiplied by 2/3. This gives us final figures (with gear) as in table 2.

H. G. Batson, *Associate I.E.E.*

Harrogate, *October 21st.*

I.E.E. Centre Meetings

I entirely agree with "M.I.E.E.'s" remarks in your issue of the 23rd October. The position in Glasgow, so far as the I.E.E. meetings are concerned, is somewhat unsatisfactory. I would suggest to the Committee and the gentlemen who appear to control the Centre that they should consider the following suggestions:—

1. That the Glasgow Branch be run entirely separate from Edinburgh, with a local "live" Committee in Glasgow.
2. Failing No. 1, that the control of the Scottish Centre be handed over to the Edinburgh Branch.
3. That more attention be paid to the social side of the Centre's activities (one over-crowded dinner-dance per annum does not meet the case). Advice on this subject could be obtained from the North-Western Centre (Manchester).

There should be no difficulty in obtaining suitable papers in the Glasgow district (other technical institutions experience no trouble in this matter), up-to-date subjects being insisted upon if well attended meetings are to result.

The meeting place should be as comfortable as possible: if smoking has to be allowed (and I have no objection) the rooms should be large and well ventilated. The present arrangement is most unsatisfactory; in fact, I have never seen anything to equal the present conditions during my thirty years' membership of the Institution.

Finally, I cannot understand why a small centre like Edinburgh should be allowed the same number of representatives on the main committee as a large engineering centre such as Glasgow.

M.I.E.E. No. 2.

Glasgow, *October 26th.*

I was interested in "M.I.E.E.'s" letter regarding the Glasgow I.E.E. meetings. He may be interested to know of the conditions that obtain here at Bristol.

This is by far the largest city in the West of England and Wales, yet for years we have had to be content with two meetings a year (not including the dinner occasionally held here). Swansea, a much smaller town, can boast of five meetings this season.

London members are the envy of the whole country.

Bristol, *October 23rd.*

Grad. I.E.E.

The Arsenal's New Stand

Electricity's share in a £100,000 building

THE Arsenal Football Club's £100,000 new east stand at its Highbury ground, which was opened on Saturday last, has been equipped with the most up-to-date electrical apparatus for the comfort, health and amusement of the players and staff, not forgetting the 10,000 or so spectators whom it can accommodate.

The players' treatment room with its array of electrical appliances reminds one of a small hospital. In addition to various different types of artificial sunlight and radiant heat apparatus there are vibratory foot massagers and diathermy equipment, including the new "Inductotherm," a neat piece of apparatus supplied by the American G.E.C. X-ray Corporation. Cuts provide the steriliser with plenty of work.

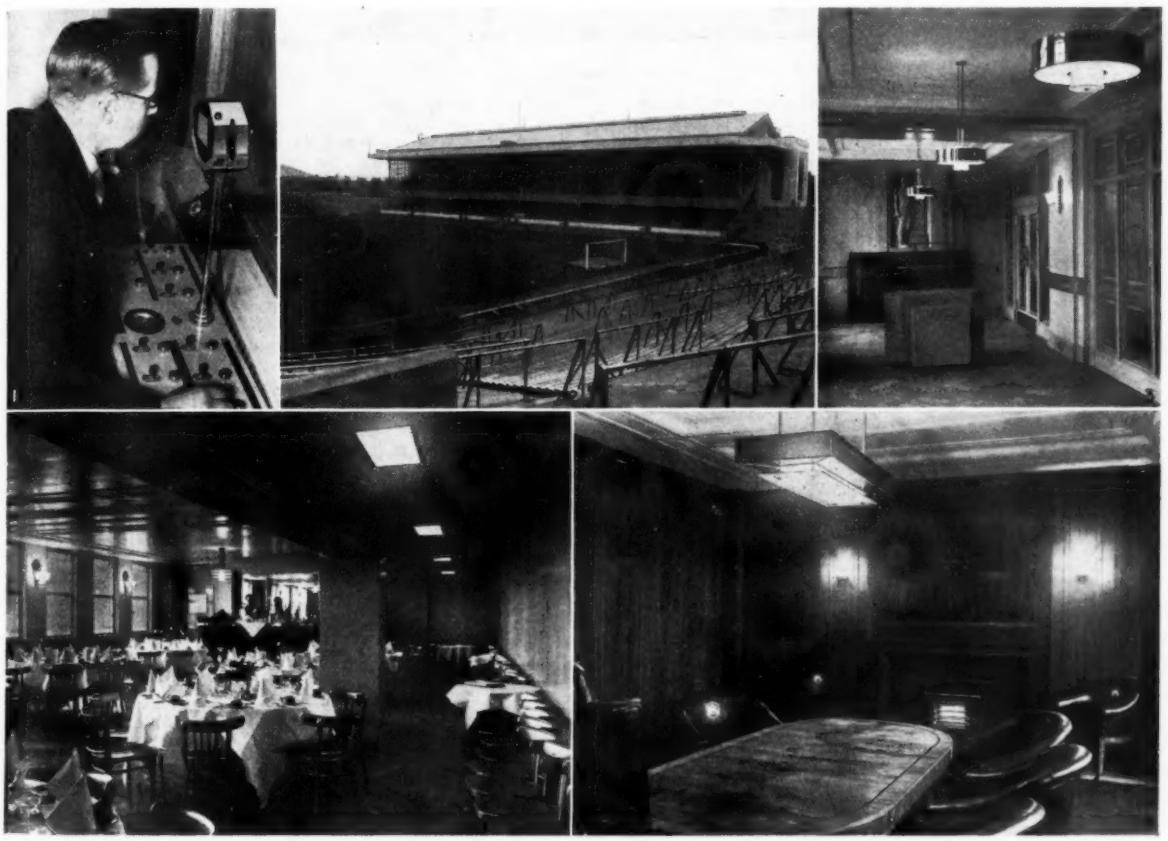
In this room, as well as elsewhere, particular attention has been paid to providing suitable lighting. Where considerations are purely utilitarian, plain rectangular, circular or spherical totally enclosed fittings have been employed, sometimes inset in the ceiling. Of more decorative design, octagonal ceiling fittings of chromium-plate and pale green glass ornamented with red illuminate the entrance and main staircase to the club's offices, while particularly attractive circular fittings, in conjunction with concealed cornice lighting over the bar, are to be found in the directors' smoking room. Three-tier bronze pendants with green and red glass together with wall brackets of novel design are supplemented in the first-floor resturant by ceiling panel lights along one side of the room.

A large rectangular pendant suspended by tubes at each corner harmonises with the luxurious setting of the walnut-panelled board-room, which, like some of the other rooms, is provided with a Bratt Colbran inset electric fire.

Perhaps the most interesting electrical feature of the new building is the public address equipment, which comprises two Marconiphone specially constructed 75-W amplifiers with a dual turntable unit, four microphones and seventeen loud speakers. The microphone points are at the trainers' enclosure, broadcasting box, the band's position and the directors' view box. The last-mentioned is particularly useful for directing the crowds and a switchboard enables whichever microphone is required to be connected up. Music can, of course, be provided from gramophone records on the turntables incorporated in the amplifier, and a room has been allocated and tubing installed in readiness for television broadcasts when they are practicable.

A Phœnix "Interdial" telephone installation links up the various parts of the building, and to announce the recommencement of play after half-time a Julius Sax bell system has been installed in the bars, restaurants, &c. "Synchronome" electric clocks are installed throughout.

In addition to the sixteen 1,000-W Strand floodlights already erected on top of the stands to enable work on the ground to be carried out after matches, a 2,000-W light is to be used to illuminate the club's coat of arms (a gun) over the main entrance. Sixteen illuminated signs supplied by Straight-lite Reflectors, Ltd., have been erected over the cloakrooms, &c., while Strand neon signs show the way to the restaurants. In the kitchens there are four Keighley electric service lifts and a hoist. James Keith & Blackman, Ltd., installed the ventilating system, and although the heating of the building is by hot water, electric pumps (driven by Crompton Parkinson motors) have to be brought into service for circulating purposes.



Views of the Arsenal Football Club's new stand:—1. The directors' view box, with microphone and public address control panel. 2. General view of the stand. 3. Directors' smoking room. 4. One of the restaurants. 5. The board room.

The main electricity supply, which comes from Islington Borough Council, at 200/430 V 3-phase a.c., is controlled from two switchrooms, one for lighting and one for power, the whole of the equipment installed having been supplied by the General Electric Co., Ltd. Every fuseboard in the building has its corresponding metal-clad switch here, and the location of failures is simplified by the installation of a small neon lamp on each to show when it is in circuit. A 200-A double-pole neutral link is provided for lighting and a similar one for heating.

Altogether nearly 40,000 yd. of Callender's "Vicma" cable were used and 10,000 ft. of conduit, which, together with local switches, was supplied by Walsall Conduits, Ltd. The flush-mounting switches used were manufactured by J. A. Crabtree & Co., Ltd., and the lighting fittings by Osler and Faraday, Ltd. The electrical contractors were T. Clarke & Co., Ltd.

The Norman Lockyer Lecture

The twelfth annual Norman Lockyer Lecture, established by the British Science Guild will be given by Lord Rutherford on November 12th in the Goldsmiths' Hall, Foster Lane, E.C.2, with Sir Josiah Stamp in the chair. The subject of the lecture will be "Science in Development."

D

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Disconnecting Box

A disconnecting box has been designed by British Insulated Cables, Ltd., Prescot, with a view to facilitating jointing. A standard central body contains bus-bars and links or fuses and is provided with the usual turret and cover. The terminals for the cable project through openings at the sides of the body and over these are bolted detachable pockets.

The main body of the box can be filled in the workshop with compound to the required height before being sent out, so that the only jointing to be done on site is to connect the cables to the terminals and to fix the detachable pockets in position. The latter can be supplied "straight," or "right angled," either right or left hand. Spare outlets are closed with a cast-iron cover. Provision can be made for cables to be added at a later date without disturbing the existing cables in the box or interrupting the supply.

The B.I. disconnecting box

Emergency Lighting Selector

For places such as fire stations where it is unnecessary for all the emergency lights to be in operation during the whole period of a main-supply failure the "Neverfayle Selective" system is being introduced by Batteries, Ltd., Hunt End Works, Redditch.

This system provides for the extinguishing of lights that are not needed after the initial stage of a breakdown, thus reducing the emergency load and lengthening the period during which the battery will maintain the lighting. Upon resumption of the main supply the apparatus is automatically reset and in the event of another failure all emergency lamps come into service. Trickle charging is unnecessary. The system is also applicable to buildings where daylight is normally available in most parts, but where emergency lighting may be required during hours of darkness.

"Anka" Connector Improvement

The "Anka" connector of Messrs. Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, London, E.C.4, is now being sold with a combined lampholder-plug and 2-pin wall-plug. The change-over is effected merely by screwing the adaptor so that the pins actually project out of the lampholder adaptor ready for plugging-in.

The 4-pint whistling kettle recently introduced by the Cooper-Stewart Engineering Co., Ltd. It has a loading of 1,000 W

A Horizontal Burning Floodlight

A new floodlight has just been produced by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2, which is designed to employ an "Osira" high-pressure mercury-vapour lamp in a horizontal burning position. This has been designed to take advantage of the favourable nature of the light source for floodlighting when using a 250-W horizontal type of lamp. In general mechanical and optical design the floodlight is similar to its predecessors, a special system has been adopted for controlling the light column magnetically.

The deflecting magnet is pivoted about the axis of the lamp, so that the magnet always lies at a fixed distance vertically below the lamp at whatever angle the unit is tilted within the margin allowed by its construction. The unit comprises sheet-metal housing in cast-iron adjustable-end brackets, fitted complete with hammered-mirror glass reflectors, magnetic reflector and all internal wiring.

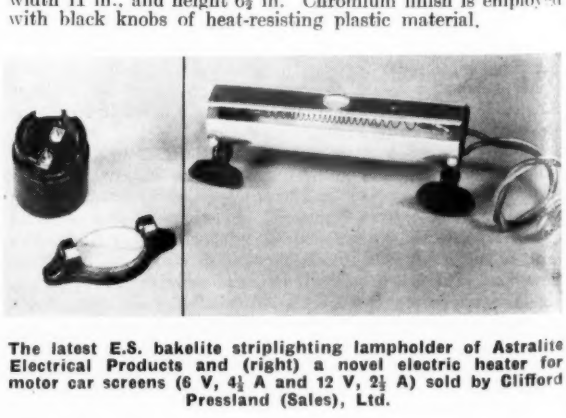
Keeping Food Warm

Two useful pieces of apparatus for keeping food warm, namely, the "Chase" electrical buffet and snack servers, are now being marketed in this country by the Metalcraft Manufacturing Co., 72, Newman Street, London, W.1. In principle they are the same, an outer receptacle being filled with hot water which is maintained at a temperature of 160 to 180 deg. F. by a concealed immersion type 7-kW element.

The "Chase" electric buffet and snack servers

Into this receptacle are placed, in the case of the buffet server, four porcelain casserole dishes, two large and two small, having a total capacity of 5¼ qt. The three dishes of the snack server, which can hold 3 qt., are of "Pyrex" glass, enabling food to be cooked in them elsewhere. A further development contemplated is the provision of double elements permitting the servers to be actually used for cooking. In summer the apparatus, filled with ice and or cold water, will keep food cool and fresh for a considerable period.

The snack server is circular in shape and measures 13 in. in diameter and 6 in. high, while the overall dimensions of the buffet model, which is rectangular, are: length 21 in., width 11 in., and height 6½ in. Chromium finish is employed with black knobs of heat-resisting plastic material.



The latest E.S. bakelite striplighting lampholder of Astralite Electrical Products and (right) a novel electric heater for motor car screens (6 V, 4½ A and 12 V, 2½ A) sold by Clifford Pressland (Sales), Ltd.

Promising African Markets

Electrical imports into Southern Rhodesia, Kenya and Uganda, Tanganyika and Nigeria

WHILE South Africa has been enjoying a period of increasing prosperity, a number of other African markets have revived as a result of the recovery in the prices of several of their leading export products. In 1935 Nigerian exports increased in value by approximately one-third compared with the previous year, and imports by 45 per cent. In the latter the United Kingdom share rose to over two-thirds of the total. The Comptroller of Customs, in his recently issued trade report for 1936, said that he saw no valid reason to suppose that 1936 would be a less prosperous year than 1935. In this connection it may be noted that prices of two important Nigerian exports—palm products and cocoa—have shown a very favourable trend this year, while the tin mines have continued to benefit from an increased quota under the international agreement. Groundnuts, although the crops have been below their normal quantity, have yielded a greater total return because of the rise in price. The Gold Coast has benefited by the increase in the value of her cocoa exports and also by gold shipments, which promise to constitute a record. On the eastern side of Africa the outlook, with some reservations, is also promising. The Commissioner of Customs of Kenya and Uganda states that the trade prospects, on the indications of the concluding months of 1935, the export figures for that year, and the crop forecasts, may be regarded as encouraging, and a measure of cautious optimism can be justified provided the speculative overstocking of imports is avoided. Imports into these territories from Japan have shown an increase at the expense of the United Kingdom and other suppliers except Germany.

Southern Rhodesia also is reaping the fruits of last year's period of expanding export trade, which then exceeded £9,000,000 (including the gold premium) for the first time, while imports rose to £6,500,000. About 75 per cent. of the total imports were from British countries.

In the accompanying statements, extracted from the official foreign trade returns of the respective territories, are shown the leading items of electrical imports in 1935, with notes of increases or decreases compared with the values for the preceding year.

	1935 £	Inc. or dec. on 1934 £
SOUTHERN RHODESIA		
Electric cable and wire—		
‡Total	37,000	+ 12,000
Electrical material not elsewhere enumerated—		
Total	25,000	—
From United Kingdom ...	14,000	—
„ Canada...	4,000	—
„ Germany	2,000	+ 1,000
„ United States	2,000	— 3,000
Electric lamps—		
Total	16,000	+ 3,000
From United Kingdom ...	13,000	+ 4,000
„ Hungary	1,000	+ 1,000
Wireless material and apparatus—		
Total	31,000	+ 7,000
From United Kingdom ...	4,000	— 2,000
„ United States	23,000	+ 6,000
Telegraph and telephone material and instruments—		
‡Total	1,000	+ 1,000
Batteries—		
Total	19,000	— 1,000
From United Kingdom ...	14,000	— 3,000
„ United States	4,000	+ 2,000
Motors—		
Total	39,000	+ 14,000
Transformers—		
Total	7,000	—
Other electrical machinery—		
Total	69,000	+ 31,000
From United Kingdom ...	56,000	+ 23,000
„ United States ...	9,000	+ 7,000
KENYA AND UGANDA		
Electric wire and cables—		
Total	15,076	+ 6,416
From United Kingdom ...	10,688	+ 3,088
„ Germany	3,071	+ 2,561
„ Belgium	1,258	+ 738

	1935 £	Inc. or dec. on 1934 £
Lighting accessories and fittings—		
Total	7,925	+ 4,325
From United Kingdom ...	7,143	+ 4,703
Electrical goods and apparatus not elsewhere specified—		
Total	21,829	+ 7,659
From United Kingdom ...	16,250	+ 5,620
„ Hong Kong	1,038	+ 638
„ United States	1,480	+ 660
Electric light bulbs—		
Total	3,530	+ 210
From United Kingdom ...	2,884*	+ 454
„ Japan	89†	— 26
Telegraph and telephone material—		
‡Total	10,076	+ 1,446
Wireless apparatus—		
Total	16,243	+ 4,843
From United Kingdom ...	8,612	+ 1,212
„ Netherlands	1,847	+ 347
Electrical machinery and parts—		
Total	33,100	+ 15,740
From United Kingdom ...	24,190	+ 8,000
„ Germany	2,235	+ 1,935
„ Sweden...	4,127	+ 3,877
„ United States	1,402	+ 502
TANGANYIKA		
Electric light bulbs—		
Total	1,200	+ 700
From United Kingdom ...	540	+ 390
„ Germany	280	+ 50
Insulated wires and cables—		
Total	6,850	+ 4,950
From United Kingdom ...	3,820	+ 2,120
„ Germany	3,010	+ 2,870
Electric wires and cables, uninsulated—		
‡Total	1,500	— 2,460
Telegraph and telephone instruments and apparatus—		
‡Total	1,140	+ 480

	1935 £	Inc. or dec. on 1934 £
Wireless apparatus—		
Total	8,000	+ 5,500
From United Kingdom ...	4,020	+ 2,120
„ United States	2,790	+ 2,610
„ Germany	540	+ 390
„ Holland	590	+ 330
Electrical goods and apparatus not elsewhere specified—		
Total	18,980	+ 4,640
From United Kingdom ...	16,050	+ 4,920
„ Germany	1,090	— 640
„ Japan	770	+ 110
Electrical machinery and parts—		
Total	44,600	+ 36,430
From United Kingdom ...	40,870	+ 36,640
„ Germany	3,400	+ 1,310
NIGERIA		
Electrical and telegraph apparatus—		
Total	30,720	+ 9,363
From United Kingdom ...	10,932	+ 783
„ U.K. Government ...	15,768	+ 7,723
„ United States	2,322	+ 1,907
Electrical machinery—		
‡Total	3,443	— 947
GOLD COAST		
Electrical and telegraphic apparatus—		
Total	66,000	+ 17,000
From United Kingdom ...	53,000	+ 12,000
„ Hong Kong	3,000	+ 3,000
„ Germany	3,000	+ 1,000
„ United States	3,000	+ 1,000
„ Japan	2,000	+ 1,000
Electrical machinery—		
‡Total	99,000	+ 70

* 50,240 in number.
† 46,647 in number.
‡ Mainly from U.K.

New Zealand's Electrical Trade

IN a Department of Overseas Trade report dealing with economic and commercial conditions in New Zealand during 1935 and up to the end of April, 1936, H.M. Trade Commissioner in New Zealand and his assistant, Messrs. R. Boulter, C.M.G., and T. G. A. Muntz, states that the depression has been far the most serious in the history of the Dominion, although evidence of recovery is now becoming apparent. The report expresses the opinion that prospects appear to be promising, especially as the prosperity of New Zealand is closely dependent upon prosperity in this country where recovery has already begun to make its effect felt.

Local production in the electrical engineering industry showed a considerable advance, the total value of manufactures increasing from £109,000 in 1933-34 to £163,000 in 1934-35, and the number of factories in operation from forty-nine to fifty-three. The advanced degree reached by New Zealand in the development of her resources of electric power accounts for the high value of imports of electrical machinery and apparatus. The shares of the principal countries of supply are shown below—the figures do not include wireless apparatus :—

	1935.
Total imports	£1,276,316
From United Kingdom	873,176
„ Canada	76,239
„ Australia	112,102
„ Germany	16,147
„ Netherlands	7,465
„ Sweden	20,141
„ Japan	11,695
„ United States	146,505

The share of the United Kingdom was therefore 68.4 per cent. of the total imports. An analysis of these figures was published in our issue of October 2nd (page 446).

Australia has secured her share of the trade in batteries and cells at the expense of Canada and the United States, who in 1928-30 were the largest suppliers, and to a smaller extent, of the United Kingdom. The imposition in August, 1934, of a British preferential duty of 15 per cent. on batteries and cells as distinct from storage batteries has transferred to the one local factory business formerly received by United Kingdom manufacturers.

The largest purchasers of cable and wire are such departments of the Government as the Public Works and Post and Telegraph Departments. These departments have always shown a strong predilection for goods of United Kingdom manufacture.

There has been a striking increase in imports of electric cookers when consideration is given to the growth of production of electric ranges in New Zealand. Activity in the building trade is partly responsible and the improvement in general economic conditions has contributed.

The position with regard to imports of radio apparatus from the United Kingdom is far from satisfactory. The general complaint against receiving sets manufactured in the United Kingdom is that they are too expensive and that they lack the range required by listeners in New Zealand. To meet the requirements of the New Zealand market a set designed for reception on short and medium waves is required.

In the Courts

Telsen Electric Co. v. Eastick & Sons

MR. JUSTICE LAWRENCE, in the King's Bench Division on October 21st, concluded the hearing of an action brought by the Telsen Electric Co., Ltd. (in liquidation) of Aston, Birmingham, against Messrs. J. J. Eastick & Sons, of Bunhill Row, London, to recover the balance of a sum alleged to be due for wireless sets, &c., sold by the plaintiffs to the defendants. Subject to liability the sum due to the plaintiffs was agreed at £416. The defendants, however, counter-claimed for damages laid at between £1,400 and £1,500 for alleged breaches by the plaintiffs of the sales agreement for price maintenance, for service after sale of the sets, and for the financing of high-purchase transactions. Defendants alleged that after a receiver for the debenture-holders of the plaintiff company was appointed the defendants continued to do business with the receiver, but eventually the whole of the plaintiffs' stock was thrown on the market, which ended the hire-purchase facilities, the result being that the defendants were left with sets and components on their hands, which became unsaleable at list prices. The plaintiff company was wound up in December, 1934.

In the result his Lordship held that the defendants were entitled to succeed on their counter-claim for damages to be assessed.

Judgment for E.S.B.

In the Supreme Court, Dublin, recently an appeal was heard in the case of Miss Agnes Cregan, Sallymount Road, Dun Laoghaire, against the Electricity Supply Board. The appeal was from a judgment of the High Court allowing an appeal of the Electricity Supply Board from a decision of the Circuit Court which awarded Miss Cregan £150 damages in respect of injuries caused to her through having come in contact with an electric pole at Corrig Avenue, Dun Laoghaire, on February 12th, 1932. The appeal was dismissed with costs. The Chief Justice, giving judgment, said that the whole question turned upon Sub-section 1 of Section 51 of the Electricity Supply Act, 1927, which empowered the Electricity Supply Board to lay lines for the transmission and distribution of electricity along, across, or under any street, road, railway, or tramway, and it seemed to him to be perfectly clear that on the terms of that sub-section and Section 51 the Electricity Supply Board had power to erect these poles for the distribution of electricity. That being so, the pole was not a nuisance in the sense in which the Circuit Court Judge dealt with it, and consequently the Circuit Court Judge was wrong in his finding that the erection of the pole was outside the duty and power of the Board, and that the Board was not protected by the Public Authorities Protection Act.

Acquisition of Shannon Fisheries

Further claims by fishery owners on the River Shannon against the Irish Free State Electricity Supply Board were heard before Mr. George Hewson, State Arbitrator, recently. In the case of the Abbey Guild of Fishermen Mr. Hewson said he thought the offer of £40,000 by the E.S.B., which had been refused by the Guild, a very good one. The Arbitrator said he would make his award in due course. An award of £8,100 was made when Dr. McAuliffe, Knock (Clare), and Miss M. McAuliffe claimed £12,000 for the acquisition of fisheries in the Shannon estuary. The Knight of Glin claimed £27,095 for the acquisition of Long Rock and Shannon Lane weirs, in the Lower Shannon, in regard to which the E.S.B. made an offer of £6,000. The Arbitrator reserved his award. Mr. Anthony Mackey claimed £7,000 for the acquisition of several fisheries in the Lower Shannon. The Arbitrator made an award of £1,650.

Central Electricity Board Fined

Four summonses for alleged breaches of the Factory and Workshops Act, which it was stated resulted in the death of a workman and injury to another at the Stafford sub-station of the Central Electricity Board's grid system, were before the Stafford magistrates on Friday last. The first summons charged the Board under Regulation I of the Act with committing an offence whereby Charles Joseph Blackman was killed, and the second related to an offence under Regulation 18 whereby Blackman was killed. The third and fourth summonses brought under the same Regulations related to offences which resulted in Albert Edwin Arnold suffering injury.

Mr. Pugh (for the Board) said that Regulation I was contained in Regulation 18, and if the prosecution was prepared to proceed on the last one only, he would plead guilty. This was agreed to.

Mr. Ball, for the Director of Public Prosecutions, explained that under Regulation 18 every switchboard for pressures exceeding 3,000 V should be made "dead" before work was commenced on it. In this case the switchboard had a voltage at the point at which the accident occurred of 132,000 V. Some rewiring had been found necessary and it was being tested before being put into commission. The work was being done under the supervision of two highly qualified electrical engineers by Blackman, assisted by Arnold. There was no complaint about the way the work was carried out on July 20th, because every precaution was taken. After closing down that evening the Birmingham control station and other stations were communicated with, the isolators were closed, the supply switched on and the sub-station made alive. The testing plant was left on the ground and the next morning there was a conference between the two engineers supervising the work. Blackman and Arnold went to the point at which the test was being carried out. Blackman climbed to the top of the circuit-breaker and Arnold was on the ground with the lead—the cable coming from the testing apparatus—which he handed to Blackman for the latter to make contact with the terminal. The whole thing was alive. There was a loud explosion and a flash, and Blackman was seen lying on his back on the top of the circuit-breaker, in flames. Arnold, whose hands were burned, assisted in getting Blackman down. Blackman was taken to the Staffordshire General Infirmary where he died from his injuries.

Mr. Pugh said that the Central Electricity Board took every precaution possible to see that such a breach should not occur, but the human element did enter into these things. He enumerated the elaborate regulations made by the Board, in addition to those provided in the Act itself, for safeguarding the workpeople, and pointed out that this particular work was being carried out under the supervision of two highly qualified engineers, while Arnold was an authorised person within the meaning of the Act. They had gone through the training laid down by the Board. With regard to the events of July 21st, the two engineers had had a conference and then one turned round and saw Blackman and Arnold go over to the switchboard. The first thing Blackman should have done was to have gone over to the control and made a request for the isolation of the switches so that the test could proceed. He did not do so. It was a matter of complete forgetfulness.

The Bench decided to fine the Board £50 on each of the two summonses with £37 14s. 6d. special costs.

Shock at a Racing Track

At the Barnsley County Court recently, damages amounting to £50 were awarded against the Wombwell Greyhound Racing Stadium. The plaintiff was Mr. J. H. Jones, Rotherham, who claimed in respect of personal injuries received when he came into contact with an electrified pole at the Wombwell Stadium in March last year. The case had been previously dismissed by Judge C. J. Frankland, who re-heard the case.

Mr. L. H. Brittain, for the plaintiff, said that Mr. Jones attended the track on March 16th last year, and, as a result of touching a pole charged with electricity, had suffered considerably from the effects of shock. At the time he experienced no very appreciable effects, but subsequently had to receive medical attention. At a previous hearing evidence was given by a man named Chadwick to the effect that he had examined the pole in question and found it to be quite in order and that no recent repairs had been effected. Subsequently, it had been established that an electrician had repaired wires in connection with the pole, and that on the night of the incident steps had been taken to ensure that no one else should approach the pole, and ladders were placed near as guards. When the electrician made his examination, he found that the wire forming part of the circuit feeding some lights had become bared and was rubbing against the steel arm of the pole.

Mr. Jones said he was standing near the track when he felt a tingling sensation in his feet and was somehow thrown to the ground. Two witnesses gave evidence of seeing Jones being thrown to the ground.

Edward Andrews (Mexborough) said that in his opinion the pole was sufficiently well earthed to carry any sudden rush of current, and he thought it impossible for plaintiff to have received a shock. If he had touched it, as suggested, when the wire was bared there would have been visible fusion, with a residue of molten copper. He had failed to find any portion of the wires which appeared to have been newly jointed.

The Judge, stating that at the former hearing there had been a great deal of misrepresentation, gave judgment for the plaintiff, with the court costs, the costs of the application, and the costs of the previous hearing.

The Training of Welders

In a paper read to the Engineering and Scientific Association of Ireland recently Mr. C. G. Harrison showed that, provided welders were trained properly and suitable materials used, electric arc welding of mild steel was a sound, economical and reliable method of joining metals, giving a greater efficiency than the riveted joint. However, unless engineers were prepared to carry out the training of welders, arc welding would be a danger and a possible source of loss. The internal stresses set up in the joint and in the structure were a cause of anxiety to engineers, and much research yet needed to be done in this regard. Much had been learned from practice, and confidence had been gained in many applications of the process. In conclusion, Mr. Harrison, who is responsible for arc welding at the Inchicore works of the Great Southern Railways Company, described the application of welding in railway workshops, and reviewed examples of welding in other industries, including warship construction. He emphasised the importance of welding in the substitution of built-up welded plate structures for steel castings.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Coronation Displays

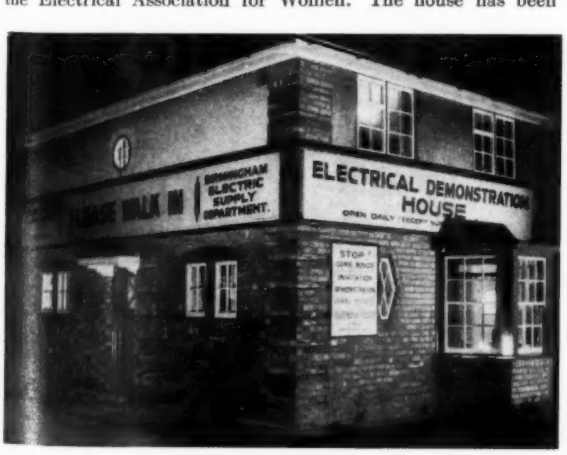
The necessity for co-operation in the arrangement of comprehensive and harmonious decoration schemes for the Coronation was stressed by Mr. C. Grey Wornum, one of the committee of three architects appointed to organise London's decorations, at a lecture to the National Display Association on October 21st. He said that the contribution of public authorities must be a minor consideration, and where the decoration of shopping streets was not being arranged by retailers' associations, shopkeepers should join together in groups, particularly those in the same building, so that some degree of continuity might be assured. Materials of a reasonably durable quality should be chosen, and while the decorations called for more or less traditional treatment, full use should be made of the modern apparatus available. On the matter of colours, the British Colour Council would give helpful advice. Flags should not be used indiscriminately, but preferably in clusters which could be illuminated by floodlighting where possible, and a general background should be obtained for each street or building. Generally a building containing a series of small shops lent itself to vertical treatment, while for many of the individual store buildings horizontal schemes would be more suitable. Street decoration schemes would not be well served by a policy of self-assertion, but this should not apply to actual window displays which should prove an opportunity for originality. Mr. Wornum expressed the hope that discrimination would be exercised in use of floodlighting, particularly the coloured variety. Although beautiful effects could be produced by this medium of decoration there was a risk of abuse by over-use. It was generally better to use floodlighting for emphasising certain architectural features rather than splash it indiscriminately over the whole building, particularly if the adjoining buildings were similarly illuminated. The greatest effect achieved by floodlighting was one of contrasts. Mrs. Wornum, who is a well-known decorative artist, endorsed her husband's remarks, and went into further details as to the effect of various combinations of colour. Several helpful suggestions regarding methods for securing co-ordination were also contributed by others present, and a vote of thanks to Mr. and Mrs. Wornum was proposed by Mr. F. R. Yerbury, managing director of the Building Centre.

The Ideal Home Exhibition

To give visitors to London during the Coronation an opportunity of visiting the *Daily Mail* Ideal Home exhibition, it has been decided to keep it open for ten days longer than usual. The exhibition will therefore open at the new Earl's Court on April 22nd and close on May 29th.

An Electrical Demonstration House at Birmingham

The accompanying illustration shows an electrical demonstration house which has been equipped at No. 11, Warren Farm Road, on the Kingstanding estate, Birmingham, by the Corporation Electric Supply Department in collaboration with the Electrical Association for Women. The house has been

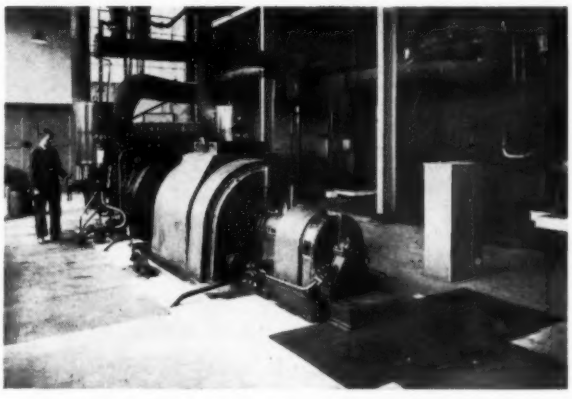


The electrical demonstration house at Kingstanding estate, Birmingham

open each week-day since October 5th, and closes to-morrow (Saturday). It contains an electric cooker, water-heating apparatus, including (a) circulator in existing hot-water tank, (b) dual-purpose wash-boiler for washing clothes and also supplying hot water directly into the bath, and (c) 1½-gal. automatic storage water heater as supplied on hire, and, in addition, fires and other electrical equipment suitable for small residential property, most of which can be obtained on hire or hire-purchase terms. The house, which is being floodlighted each evening, was formally opened by Alderman A. E. Ager, of the Electric Supply Committee, supported by Councillor Mrs. C. G. Garrard, chairman of the Birmingham branch of the E.A.W. Nearly 5,000 people visited the house during the first fortnight, and a large number of inquiries are being received as a result. Concurrently, cookery demonstrations are being held twice weekly in a neighbouring hall, which is being filled on each occasion.

Power for the Sugar Industry

The British Thomson-Houston Co. has recently supplied a 2,000-kW maximum rated, 3,000-r.p.m. back-pressure turbo-alternator (3 phase, 50 cycles, 440 V, 0.7 power factor) for the Bardney factory of the Lincolnshire Sugar Co., Ltd. Until the installation of this turbo-alternator the power requirements



A 2,000-kW B.T.H. turbo-alternator in a sugar factory

of the factory were supplied by a reciprocating engine-driven generator, the latter still being held in reserve. A similar B.T.H. turbo-alternator, rated at 1,500 kW, has also been installed recently in the Brigg factory of the Second Lincolnshire Sugar Co., Ltd.

Edinburgh's Preference for British Plant

At its last week's meeting the Edinburgh Public Utilities Committee decided to recommend the acceptance of a tender for a turbo-alternator at £89,219 by Richardsons Westgarth-Brown Boveri, Ltd., although it was £18,556 in excess of the price tendered by Brown Boveri & Co., Switzerland. Reporting on the matter Mr. E. Seddon, the city electrical engineer, said that although the Swiss company's plant was lowest in first cost and in annual operating expenses, the Central Electricity Board was not favourable to the acceptance of a foreign tender. The plant offered by the British company was similar to the Swiss set and the difference in price was the extra cost of having the machines made in this country. Five of the seven existing turbo-alternators at Portobello had been supplied by the Swiss company and had given satisfaction. The next lowest offer on an annual cost basis to that of Richardsons Westgarth was that of the Metropolitan-Vickers Elecl. Co., Ltd. Richardsons Westgarth had not yet built a generator of the size required, although they had offered to build one at their Hartlepool works. They were willing, however, to supply and fit to their turbine any alternator made by a reputable British concern. Mr. Seddon therefore recommended that this portion of the set should be sub-let to the English Electric Co., Ltd. In coming to its decision the Committee was helped by a statement by Mr. V. Watlington, director of B.E.A.M.A., who explained to the Committee's satisfaction how the difference between the two prices arose.

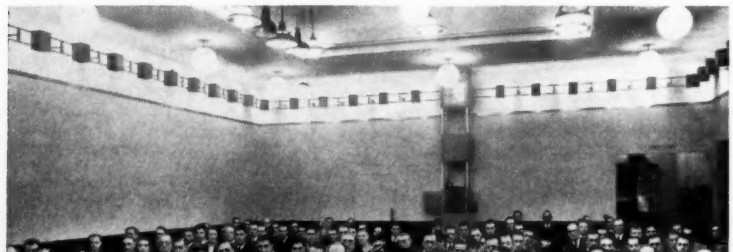
Enlarged E.C.A. Activities

During the past six years the membership of the Electrical Contractors' Association and its allied bodies—the N.E.C.T.A., Ltd., and the National Federated Electrical Association—has increased by 30 per cent. This has naturally created a great deal of additional work for the officers and staff, which is being still further augmented by the extension of the Association's activities. Recently there was formed a fourth body—the National Association of Radio Retailers, Ltd.—to look after the interests of bona fide dealers in radio equipment, and now a fifth is foreshadowed. The National Electrical Contractors' Trading Association, Ltd., has a membership comprising contractors and contractor retailers; the electrical dealer, as such, is not catered for. It is considered that there is a need for an organisation which shall look after the interest of these retailers and the matter is being studied by a special committee consisting of the president of the E.C.A., Mr. H. M. Drake, the vice-president, Mr. H. E. Walker, the chairman of the Executive, Mr. W. H. Walton and the Director, Mr. L. C. Penwill. As a result of the above-mentioned activities the Association's

present headquarters has become inadequate, and arrangements have therefore been made to move to more suitable accommodation at Africa House, Kingsway, W.C.2; it is anticipated that this move will be made in December.

Marconi Pension Scheme

Over 95 per cent. of the eligible operatives employed at the Chelmsford Works and other production establishments in this country of Marconi's Wireless Telegraph Co., Ltd., have enrolled in a pension and life assurance scheme put forward by the directors. The main purpose of the scheme is to make provision for retirement through age or invalidity and for life assurance during the years of employment, thus establishing a sense of security for the future. A pension fund for the staff is already in existence, and the new fund is intended to benefit the rest of the company's employés, who are principally engaged at the Chelmsford Works and the Hackbridge Aircraft Establishment near Croydon. The scheme is a contributory one, the cost being shared between the members and the Marconi Company.



The gathering at the Illumination Design Course held recently at the Lighting Service Bureau

Hornsey Cooking Demonstrations

The Hornsey Borough Council Electricity Department (chief electrical engineer, Mr. F. C. Orchard) collaborated with the Cooker Department of the General Electric Co., Ltd., in presenting to crowded audiences on October 20th, 21st and 22nd a new propaganda playlet with an all-professional cast which led up to an instructive cooking demonstration by Miss A. R. Powell, of the G.E.C. Each demonstration was prefaced by a short explanation of the Council's tariff governing the hire-purchase of "Magnet" cookers and the average weekly cost of electricity for cooking based on a consumption charge of ½d. per kWh. The distribution of free gifts of electrical appliances to lucky ticket-holders was an added attraction. The Town Hall, which accommodates one thousand people, was filled to capacity by invitation at each of the two daily performances (3 p.m. and 7.30 p.m.).

Orders Recently Booked

The Cambridge Instrument Co., Ltd., has recently secured a contract from the London County Council for supplying seven electrical CO_2 recording outfits to be installed in various hospitals. Other orders for Cambridge CO_2 recorders include a contract for four outfits received through J. G. Kincaid & Co., Ltd., Greenock, to be installed on Clan Line steamers.

Taking Their Own Medicine

The question has been raised whether electrical contractors are using electricity in their own houses to the extent that they ought. To enable the question to be answered so far as the Birmingham and Shropshire, Worcestershire and Staffordshire areas are concerned, members of the E.C.A. in those areas were asked to provide particulars of their domestic usage of electricity. Up to the present forty contractors in the Birmingham area have responded. The households of these total 144, and as the aggregate consumption during 1935-36 was 168,000 kWh, the average consumption per head was 1,166 kWh. The average cost per house per annum was £16 10s., the average cost per kWh being 0.9d. Altogether there were 290 heating outlets (7.25 per house) and each house had an average of 6.5 kW of electric fires, and there was also a total of 11.35 kW of tubular heating among the 40 houses. There were 24 electric cookers and 16 gas, &c., cookers. Twenty-six houses had electric water heating. In fifteen of these separate metering showed a consumption of 360 kWh per head for water heating and in eight of them the cooking consumption was shown to be 407 kWh per head. In the S.W.S. area nineteen contractors have reported households totalling 76 persons and an annual consumption of 72,200 kWh—950 kWh per head. The average cost per house was £18 11s. 6d., giving an average price per kWh of 1.17d. There were 130 heating outlets (6.8 per house) and 113 kW of fires (5.9 kW per house). Fourteen out of nineteen cookers were electric, and nine houses had electric water heaters. Of the last five had separately-metered water heating indicating an average consumption of 470 kWh per head per annum.

Illumination Design Course

The thirty-fourth Illumination Design Course was opened at the E.L.M.A Lighting Service Bureau, 2, Savoy Hill, W.C.2, on October 12th, by Mr. N. V. Everton, chairman of the E.L.M.A. Council. In welcoming the large number of executives and technicians who attended, he said the public were now alive to the necessity for better lighting, and therefore it was all the more important for those who guided the public to possess a thorough knowledge of the subject, and only by keeping in close touch with the manufacturers could this be achieved, because new facts about lighting were being discovered every day. Thus it was that the Design Course met the industry's need. Mr. W. J. Jones, M.Sc., M.I.E.E., manager of the Lighting Service Bureau, spoke on the Better Light—Better Sight Campaign and gave details of the co-operation of E.L.M.A., E.D.A. and the Joint Council of Qualified Opticians. The discussion was opened by Mr. A. E. McKenzie, M.I.E.E., M.I.Mech.E., borough electrical engineer of Wimbledon. The second conference was opened by Mr. C. A. Hughes, and the speaker was Mr. L. E. Buckell, who emphasised the need for organised maintenance of lamps, saying that in large industrial installations where this method was not employed the cost of changing one lamp worked out at something in excess of 1s. 6d.; one street lighting authority of which he knew reckoned that a single lamp renewal cost 14s. 6d. He referred to the new small high pressure mercury electric-discharge lamps and explained the method of operation and demonstrated the effect of fluorescent powders on colour rendering. The discussion was opened by Mr. E. G. Savage, C.B., Chief Inspector of the Board of Education, who, in referring to Mr. Buckell's point of lamp maintenance, suggested that lamp retailers should make a note of each sale and advise their clients when their lamps were reaching the time for renewal.

New B.I. Offices at Prescot

Owing to continued expansion of its business, British Insulated Cables, Ltd., has found it necessary to provide additional office accommodation at Prescot. The addition, which has recently been completed, takes the form of a four-storey annexe to the existing office buildings, with which it is connected on each of the three lower floors. An interesting feature of the design is a parking space under one end of the building, where callers can leave their cars under cover. Part of the ground floor is utilised as a showroom in which examples of the range of B.I. products will be maintained as a permanent exhibition.

The new extension to the Prescot offices of the British Insulated Cables, Ltd.

Electrical Development at Harrow

Harrow's first electrical exhibition was held at the Victoria Hall during last week. The organisers, the Harrow Electric Light & Power Co., Ltd., a subsidiary of the "Northmet" Co., recently introduced a new five-year hire-purchase cooker scheme, and demonstrations were held twice daily. Consumers have the choice of Hotpoint, G.E.C. and Jackson models, and an electric kettle is supplied with each, while

under the two-part tariff the running charge for electricity consumed is ½d. per kWh. Standard "Ideal" hot-water radiators, with individual thermostatically controlled elements for the heating of halls, bedrooms, &c., are now available, fitted by the supply company. The loadings are from 500 to 3,000 W for rooms of from 500 to 6,000 cu. ft.

The 1938 Empire Exhibition, Glasgow.

In opening an exhibition of household goods and electrical appliances, one of a series of displays of Scottish Special Areas products arranged at British Industries House, Marble Arch, on Friday last, Sir Harry McGowan, chairman of Imperial Chemical Industries, congratulated the Scottish Development Council and Sir David Allan Hay, Commissioner for Special Areas in Scotland, for giving the lead, and said that the displays served to remind the world of the quality and character of Scottish enterprise. The decision to hold an Empire Exhibition in Glasgow in 1938 was a wise one and he hoped that the example of the I.C.I. in giving £10,000 to the guarantee fund would be followed by others. Much could be done by Governments in easing the way of trade across the world frontiers. High tariffs, quotas and exchange restrictions had operated for years against the recovery of international trade, but within the last few weeks currents had been set moving in the financial and economic life of the world which might well mark the beginning of a new era, as well as a new hope in Europe and the rest of the world. He hoped and believed that the exhibition would attract many buyers and succeed in giving a fillip to many industries in Scotland. The Earl of Elgin and Kincardine, president of the Scottish Development Council, who took the chair, enlarged on the aims of the display and of the necessity for finding new enterprises. A vote of thanks to Sir Harry McGowan was proposed by Sir David Allan Hay. Among the companies exhibiting are British National Electrics, Ltd. (domestic appliances, including vacuum cleaners, cookers, fires, lamps and irons); J.P. Tubular Heaters, Ltd. (heating equipment); Aurora Lamps, Ltd. (lamps); L. G. Sterne & Co., Ltd. (refrigerators); and Aluminium Castings Co., Ltd. (special utensils for electric cooking).

Prices of Materials

Messrs. Henry Gardner & Co., Ltd., report, October 28th:—No change in the price of copper bars (best selected), sheet and rod and English pig lead. Spelter, £15 2s. 6d., 2s. 6d. increase. English block tin, £198 10s., £1 decrease.

Messrs. Frederick Smith & Co. report, October 28th:—Electrolytic copper bars, £46 15s., 15s. increase. Ditto, ditto, wire rods, £52 15s., 15s. increase. Ditto, ditto, h.c. wire, 8/32d., 1/32d. increase. Silicium bronze wire, 8 1/32d., 1/32d. increase.

Messrs. Edward Till & Co. report, October 28th:—India rubber, Para fine, 10⅝d., ⅛d. increase.

Social Events

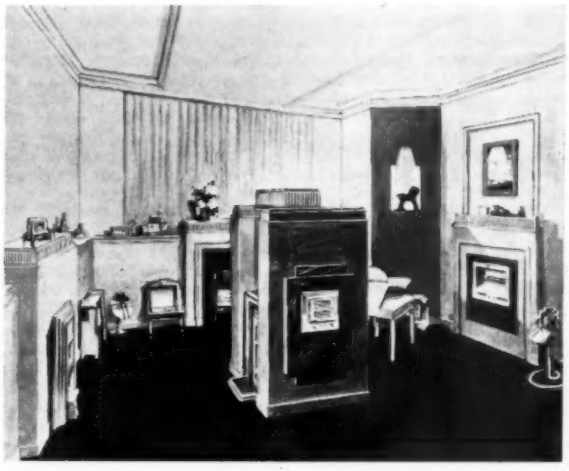
The G.E.C. Dramatic Society gave further evidence of its strength and versatility on Monday and Tuesday last when it presented "Autumn Crocus," by C. L. Anthony, at the Fortune Theatre, W.C. The action of the play takes place in the Austrian Tyrol, and its success depends upon its charm and characterisation rather than a climax. Once again Mr. William Avenall, in a long and difficult part, gave one of those finished performances with which we have come to associate him, while Miss Cecilia Ridler gave a charming interpretation of "The Lady in Pince-nez." The cast included many who have established themselves as firm favourites, but special mention should be made of Miss Lilian Ellison and Mr. Hugh Johnson—newcomers, we believe—who, as jovial German husband and wife, put us all in excellent humour. The proceeds of both performances are being given to the Electrical Trade Commercial Travellers' Association charities, and a full house on each evening indicated that these charities will substantially benefit. A picture of one of the scenes appears on page 600.

A swimming gala of the employés of the Automatic Telephone & Electric Co., Ltd., and its subsidiary Elexcel, Ltd., was held on October 14th at the new Harold Davies' Baths, Knotty Ash, Liverpool. The entrants were drawn from the 5,000 employés at the Strowger & Victor Works, Liverpool, and at the conclusion of the events the prizes were presented by Ald. Richardson (Deputy Lord Mayor of Liverpool).

Representatives of A. Reyrolle & Co., Ltd., who attended a sales conference held at Hebburn recently

Hotpoint Fire Showrooms

The accompanying illustration is an artist's impression of the new showrooms recently opened by the Hotpoint Electric Appliance Co., Ltd., at their head office, 24, Newman Street, London, W.1. These showrooms have been designed primarily for displaying the company's electric fires, and each appliance is shown in such a position as it may ultimately occupy and in surroundings in which its appearance and decorative value may be easily appraised. The method of indirect lighting adopted most successfully illuminates the goods to be displayed without introducing any disturbing influences. Owing to the limitation of the mains supplying the building, precautions had to be taken to prevent more than a few fires being connected at the same time. This difficulty has been ingeniously overcome by arranging that only one fire at a time can be plugged on to each circuit. The individual fire leads are each plugged into flush outlets. The wiring (in the form of cab tyre flex leads) is brought from these outlets to a limited number of boxes concealed in the panelling, each lead terminating in a plug top. In each box is a switch plug from which any one outlet can be energised by plugging in the appropriate lead. Clear indication is given by each plug top as to which outlet is connected to it. The installation was carried out by Furdecor, Ltd.



An artist's impression of the new fire showrooms of the Hotpoint Electric Appliance Co., Ltd.

Electrical Commercial Travellers

The annual dinner-dance of the Electrical Trades' Commercial Travellers' Association will be held on November 20th at the Criterion Restaurant, Piccadilly Circus, W.1.

A Reyrolle Sales Conference

A sales conference of representatives of A. Reyrolle & Co., Ltd., from all parts of the country was held at Hebburn from October 22nd to 24th. The accompanying illustration shows those who attended in one of the new shops which are now being built to meet the increasing needs of the company.

Electricity Charges at Croydon

Several consumers of electricity for power purposes registered a strong protest at Monday evening's meeting of the Croydon Borough Council against the introduction of the maximum demand system of charging. A deputation representing about fifty industrial concerns, as well as builders, bakers and laundry proprietors, submitted a memorial asking for a substantial reduction in the charges for power. The deputation attended in view of the recommendation of the Electricity Committee, before the Council that evening, that reductions amounting to £22,634 a year should be granted under the lighting and domestic rates, the all-in business rate and that for bulk supplies to large stores. Mr. A. R. Davis, the spokesman, said that industry had been encouraged to expect that the grid system, by pooling resources and wide organisation, would provide cheap electric power for the whole country. Its immediate effect in Croydon had been to increase the cost of power. So large were the increases that it was difficult to resist the conclusion that a grave miscalculation had been made. The bill for electricity supplied to one Croydon factory increased from £403 a year to £560 as the result of the new system of charging. A small man found that his bill increased from £61 7s. to £102. The Council referred the matter to the Electricity Committee for consideration, and approved the reductions recommended.

At the same meeting Coun. A. L. Boddington, chairman of the Electricity Committee, moved that every committee, before recommending work involving the provision of electrical appliances on the instruction of a consulting engineer in connection with that apparatus, should obtain a report from the borough electrical engineer. The motion was approved.

Glasgow Electricity Department Lectures

The latest addition to the activities of the Glasgow Corporation Electricity Department is the introduction by Mr. A. M. Estcourt, secretary and treasurer of the Department, of a course of lectures to be delivered to members of the staff during the ensuing winter. The first of these lectures was given on October 23rd at the headquarters of the Electricity Department by Mr. J. Campbell, whose subject was "The Duties of a Meter Inspector." Mr. Estcourt, who occupied the chair, explained that the lectures had been prepared with the object of affording members of the staff facilities for gaining a more intimate knowledge of the working of the various sections of the undertaking, and to stimulate interest in the manifold operations of the Department.

Local Exhibitions

At the recent trades exhibition organised by the St. Helens (Lancs) Chamber of Trade the St. Helens Corporation Electricity Department exhibited an all-electric model bungalow which proved to be one of the most interesting features of the exhibition. The bungalow comprised a lounge, dining room, bedroom, bathroom and kitchen. The opportunity was taken to illustrate the practical application of the storage hot-water system, inset type fire, bracket lighting, flush-type electric clocks and electric cooking. The kitchen was designed as a lecture room, where practical cookery demonstrations were conducted at frequent intervals during each day. In the course of the week, it is estimated, approximately 2,000 people attended the demonstrations, while about 30,000 people viewed the bungalow.

An exhibition is in progress at Electric House, Regent Road, Great Yarmouth, and it will close to-morrow (Saturday). A number of well-known firms have collaborated with the Electricity Committee and are taking full advantage of the recent reductions in electricity charges announced in the borough. The exhibition, which is one of the most comprehensive ever held in Yarmouth, was opened by the Mayor (Mrs. A. M. Perrett), Mr. W. G. Knights (chairman of the Electricity Committee) presiding. Mr. Percy Rycroft, the borough electrical engineer, proposed a vote of thanks.

Trade Announcements

The telephone number of the London sales and service office of George Ellison, Ltd., 131, Victoria Street, S.W., has been changed to Victoria 1083.

J. B. Hyde & Co., Ltd., have removed to Wythenshawe, Manchester (telephone: Wythenshawe 2850; telegrams: "Braiding, Didsbury").

The telephone exchange of the General Electric Co., Ltd., at Magnet House, Kingsway, W.C., has been extended, and Temple Bar 8000 has now ninety lines.

Our Trade with China

The Export Credits Guarantee Department announces that it has appointed Mr. W. M. Kirkpatrick, M.P., to be its representative in China. Mr. Kirkpatrick, who is vacating his seat in Parliament, will spend a short time in the Department's London office, and thereafter proceed at an early date to his headquarters in China. He will work in close contact with Mr. Louis Beale, C.B.E., the Commercial Counsellor to H.M. Embassy. The purpose of Mr. Kirkpatrick's appointment is to enable a representative of the Department to examine and consider on the spot proposals submitted for a guarantee, to make any detailed investigations required and to assist if necessary with the negotiations. He will not initiate propositions or seek orders, but will be solely concerned with the financial and economic merits of proposals for the export of United Kingdom goods which appear suitable for consideration under the British Export Credits Scheme.

New Catalogues and Lists

Electric Vans, Ltd., 14-15, The Colonnade, Guildford Street, Russell Square, London, W.C.1.—A leaflet describing small electrically driven handcarts.

Batwin Electrical Appliances, Ltd., 138, Southwark Street, London, S.E.1.—A leaflet showing new "Sessions" clocks.

Ekram Electric, Ltd., Vereker Building, Gresse Street, Rathbone Place, London, W.1.—A catalogue of electrical accessories and lighting fittings.

T. Bolton & Sons, Ltd., Widnes, Lancs.—Photographic cards illustrating bolts and nuts in high-tensile copper alloys, copper tubes, and switchgear components in high-conductivity copper.

Z Electric Lamp & Supplies Co., Ltd., 21, Newman Street, London, W.1.—A 112-page electrical catalogue, bound in a stiff cover, for those engaged in the wiring industry.

F. C. Heayberd & Co., 10, Finsbury Street, London, E.C.2.—A catalogue of electric battery chargers.

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.—Details of the chainomatic balance, sulphur dioxide determination apparatus, modern distillation, Moritz curbo-stirrers, and Sand's electrochemical apparatus.

Richard Johnson, Clapham & Morris, Ltd., Jacem House, Trafford Park, Manchester, 17.—A catalogue of domestic appliances, including lighting fittings, radio receivers, batteries, torches.

Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester.—Technical details and illustrations of the "Corcooled" motor.

The "Typerlite" Co., 86, Cannon Street, London, E.C.4.—The latest illustrated catalogue of "Typerlite" lighting units.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, London, S.W.1.—A catalogue of material in stock for October.

Bankruptcy Proceedings

J. V. Wilson, 20, High Street, Bromsgrove, electrical contractor.—At the first meeting of creditors held in this matter on October 20th, at the Official Receiver's Office, 3, Sansome Place, Worcester, it was reported that there was a deficiency of £854 on liabilities of £1,252.

T. Mehew, Victoria Road, Netherfield, Notts, electrical engineer and contractor.—At the first meeting of creditors of the above held at the Official Receiver's Office, 22, Regent Street, Park Row, Nottingham, on October 21st it was disclosed that there was a deficiency of £155. The matter was left in the hands of the Official Receiver, as trustee.

C. B. Allsop, trading as C. B. Allsop & Co., 69, Gt. Hampton Street, Birmingham, radio wholesaler.—The public examination herein was held at the Court House, Corporation Street, Birmingham, on October 21st. Debtor said his present position was due to decline in trade since 1931. Until that time customers purchased component parts and built their own sets, but then they started buying manufactured sets. Debtor commenced the business in July, 1924, with a capital of £100, and traded as a wholesaler. The examination was closed subject to the signing of the notes.

F. W. Albinson, 73, Stanton Road, Sandiacre, Derbyshire, formerly electrical engineer.—Decline in turnover owing to the introduction of an assisted wiring scheme in the area and keen competition were given as the causes of failure by this debtor when he attended at the Court House, 20, St. Peter's Churchyard, Derby, on October 20th for his public examination. The liabilities amounted to £129 with a deficiency of £114. The examination was closed.

J. W. Froggatt and **G. T. Shackleford** (F. & S. Radio), electricians, The Coneries, Loughborough.—Receiving order made October 19th on debtors' own petition.

H. Bannister (Henry Bannister & Co.), electrical goods factor, 48, Old Moat Lane, Withington, Manchester.—Application for discharge to be heard on November 16th at the Court House, Manchester.

C. J. Mount, electrical contractor, White House, East Acton Lane, W.3.—Discharge suspended for three months until December 28th, 1936.

R. W. Brown (North Side Radio), 72, Promenade, Bridlington.—Discharge suspended for two months until November 29th, 1936.

T. Ward, radio and battery engineer, 7B, Richmond Street, Bridlington.—Discharge suspended for four months until January 29th, 1937.

D. J. Spire, electrical engineer, Market Place, Bourne.—Discharge suspended for nine months until June 29th, 1937.

M. Chesler, wireless and electrical dealer, 186, St. Paul's Road, Balsall Heath, Birmingham.—Trustee, Mr. F. E. Bendall, 3, Warwick Passage, Corporation Street, Birmingham, released September 22nd.

A. Roberts, electrical and radio engineer, 73, Church Street, Gainsborough.—Trustee, Mr. E. C. Midgley, 1, St. Swithin's Square, Lincoln, Official Receiver, released October 14th.

C. W. Prosser (Prosser Bros.), electrical engineer, 81, Woodside Street, Cinderford, Glos.—Last day for receiving proofs for dividend November 10th. Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver.

W. H. Tordoff, electrical engineer, 10, Burnett Avenue, Manchester Road, Bradford.—First and final dividend of 2s. 3½d. in the £, payable October 29th at 71, Manningham Lane, Bradford.

J. L. Gaved, electrical transmission engineer, 7, St. Stephen's Street, Bristol.—Receiving order made October 15th on a creditor's petition. First meeting October 30th at 26, Baldwin Street, Bristol. Public examination December 4th at the Guildhall, Bristol.

G. Warder and **R. Warder** (Warde Richards), radio dealers, 100, George Street, Hull.—Public examination November 17th at the Guildhall, Hull.

D. A. Bolton, electrical contractor, Palace Chambers, Bridge Street, Westminster, S.W.1.—Trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, W.C.2, Official Receiver, released October 7th.

E. J. Levermore, electrician, The Cycle Shop, Queen's Road, Weybridge.—Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C.1, Official Receiver, released October 5th.

R. J. Eggleston, electrical merchant, Huddersfield Buildings, Talbot Road, Port Talbot, Glam.—Trustee, Mr. L. S. Findlay, 35, Windsor Place, Cardiff, released September 22nd.

W. C. Bryant, electrical and wireless engineer, 13, Rodbourne Road, Swindon.—Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver, released October 12th.

Company Liquidations

Robot Radio, Ltd.—Meeting November 24th at 1-3, Bridgewater Viaduct, Knott Mill, Manchester, to receive an account of the winding-up by the liquidator, Mr. F. Anderson.

James Spencer & Co., Ltd.—Meeting November 25th at 31, Princess Street, Manchester, to receive an account of the winding-up by the liquidator, Mr. F. Smith.

Reduction of Capital

Veritys, Ltd.—A petition has been presented to the High Court for (a) the sanctioning of a scheme of arrangement proposed to be made between the company and its respective debenture stockholders, debenture holders and shareholders, Achilles Trust, Ltd., Bertram Charles Evans, and Cyril John Evered Pitt, and (b) the confirmation of the reduction of the capital of the company from £195,000 to £3,500. The petition will be heard in London on November 2nd.

Electricity Supply

Lighting, Domestic, Power

Australia.—Adoption of Earth-leakage Switches.—The State (Victoria) Electricity Commission is to spend more than £300,000 on installing earth-leakage switches in all Melbourne and suburban buildings connected with the electricity supply mains.

Power Station Extensions.—It is planned to spend £443,000 on extending the State Electricity Commission's "B" power station at Newport, four miles from Melbourne. The biggest part of the work will be a new boiler house costing £368,000. —*Reuter's Trade Service.*

Supply in the West.—The power plant of the Western Australian Government generated 107.7 million kWh in the year ended June 30th last, an increase of 10 per cent. over the previous year. Most of the electricity generated was distributed in bulk supplies, the average selling price being 0.880d. per kWh (against 0.885d.), and the average cost per kWh sold was 0.77d. (0.78d.).

Barnard Castle.—Extensions.—Plans submitted by the North-Eastern Electric Supply Co., Ltd., for the extension of the electricity network to Bell Farm, Newbiggin, and other areas have been approved by the Rural District Council.

Barnsley.—Wiring Scheme.—The Corporation has applied for a loan of £5,000 for hired wiring.

Barrow-in-Furness.—Sub-station Extension.—The Electricity Committee is to extend the sub-station and plant at Natal Road at a cost of £5,100. Sanction is also being sought to loans of £6,000 for meters and £4,000 for sub-station plant.

Estate Electrification.—The Corporation is to lay low-voltage mains to the Little Park, Risedale and Roosegate estates, and the streets are to be lighted by electricity.

Bedford.—Loan.—Sanction is being sought by the Electricity Committee to a loan of £10,000 for domestic appliances to be let out on hire.

Mains Extensions.—The Electricity Committee is to extend mains to Old Warden (£312), Cranfield (£72), Chicksands Priory (£254), and the Elstow Road housing estate (£1,000).

Blackpool.—Successful Illuminations.—The illuminations which concluded on October 19th have been among the most successful for many years, nearly two million people having visited the resort to see them.

Bolton.—Free Electricity during Coronation Celebrations. —Electricity is to be supplied free for one week to existing consumers for special illuminations during the Coronation celebrations. A connection fee of 5s. is to be charged.

Calne (Wilts).—Rural Extensions.—The villages of Derry Hill and Studley are to be connected to the electricity supply network of the Gas and Electricity Department, the cost of the extensions being £1,057.

Carlisle.—Assisted Wiring.—Sanction to borrow £7,000 for assisted-wiring installations is being sought by the Electricity Committee.

Clitheroe.—Mains.—Electric cables are to be laid in connection with the erection of thirty-two houses on the Edisford housing estate.

Consett (Co. Durham).—Council Houses and Electricity.—A resolution passed many years ago forbidding Council house tenants who are in arrears with their rent to have electric lighting installed has been rescinded. In future each application for electricity will be judged on its merits.

Coventry.—Rural Extensions.—Mains extensions to Berkswell and adjoining localities are to be carried out by the Electricity Department.

Crewe.—Cheaper Electricity.—Further concessions to consumers are being made by the Crewe Corporation. The residential tariff is being reduced from 4s. to 3s. per assessable room per quarter, while meter rentals are being lowered.

Coronation Plans.—The Electricity Department is considering a scheme of Coronation illuminations for public places at a cost of £500.

Croydon.—Extensions.—The Electricity Committee is to extend cables, at a cost of £369, to meet the demands of new factories in course of erection at the Croydon Factory Estate. Sanction has been obtained to a loan of £4,100 for a sub-station and £28,283 for a ring main. The County of London Electric Supply Co. is being asked by the Corporation to extend cables at Shirley at a cost of £1,000.

Reductions.—The following reductions in charges have been approved by the Electricity Committee: Flat rate, from 5½d. to 5d. per kWh; "all-in" domestic rate, from 0.625d. to 0.5d. per kWh; "all-in" business rate, from 0.625d. to 0.5d. per kWh; high-voltage bulk supplies to large stores, standing charge reduced from £5 10s. to £5 per annum per kW.

Free Electricity for the Coronation.—In connection with the Coronation celebrations the Electricity Committee recommends that all apparatus shall be connected to the lighting system at a registration fee of 6d. per connection, and that a supply of electricity shall be given free of charge during a period not exceeding one week.

Douglas.—New Generating Plant.—The Council has accepted a tender for the supply and erection of a 3,750 kW turbo-alternator and auxiliaries, at a cost of £19,905.

Dover.—Loan.—The Town Council has received sanction to a loan of £3,000 for consumers' apparatus in connection with the change-over in High Street.

Great Yarmouth.—Public-lighting Improvement.—The Corporation has applied for a loan of £5,239 to improve the lighting of a number of thoroughfares in the borough.

Lower Charges.—Further reductions in charges have been authorised, the amended rates being as follows: Domestic tariff in the borough, 10 per cent. of rateable value, plus ½d. per kWh, and in the rural area 15 per cent. of rateable value, plus a "unit" charge of ¾d.; business tariff, £9 per kW per annum for first 10 kW and £7 per kW per annum beyond, plus ½d. per kWh; power, over 5,000 kWh per quarter and up to 15,000, 1d. per kWh, or an alternative rate of £4 10s. per kW per annum, plus ½d. per kWh.

Isle of Wight.—Lower Charges.—The Isle of Wight Electric Light and Power Co., Ltd., has reduced the flat rate for lighting to 6d. per kWh; the two-part tariff "unit" rate is now ¾d. and that for heating ½d.

Kent.—Electricity and Fruit Growing.—Farmers in East Kent are taking advantage of the electricity supply now available and a number of farms have recently been connected. Power has been supplied to Stone Stile, Chilham, and to a large cold store for fruit at Selling Station, near Faversham. Overhead cables are used and the supply is being taken to many houses and farm buildings.

Laurieston.—Electricity for Public Lighting.—Electricity has been adopted for public lighting. The supply will be given by the Dumfries-shire County Electricity Department.

London.—Poplar.—The Electricity Committee is to equip the annexe to Poplar High Street sub-station as an a.c. sub-station at a cost of £1,511; it is also to erect a sub-station at Phœnix Wharf at a cost of £1,023.

Stepney.—It is proposed to make available to consumers occupying flats and other premises wired by the Council a tariff similar to that adopted last July in regard to L.C.C. tenements. The proposal embraces a scheme whereby the weekly standing charges are to be incorporated in the ordinary rentals collected by the owners, for which service such owners will receive five per cent.

Fulham.—It was reported to the Borough Council on Wednesday that, subject to no unforeseen circumstances arising, the new power station would start commercial operation on November 1st, and that it was expected to be on full load by January next.

Stoke Newington.—It is proposed to install mercury-vapour electric-discharge lamps for the lighting of Albion Road and Church Street at an estimated cost of £1,640.

Southwark.—The Electricity Committee has had under consideration the adoption of an all-in rate for "free" wiring consumers on the lines of the existing domestic rate which is available to consumers who have provided their own installations. The proposal, briefly, is that such consumers shall pay a fixed standing weekly charge to cover the cost of wiring and the hire of a cooker and kettle, and a running charge of ¾d. per kWh.

Macclesfield.—Cheaper Electricity.—The Macclesfield Electricity Co., Ltd., has reduced the domestic power rate from 2d. to 1½d. per kWh. It has also modified the rateable value tariff and lowered the charge for outside shop window lighting from 3d. to 1½d. per kWh. The minimum charge is to be based on a six-monthly period instead of one month.

Mexico.—Hydro-electric Power Development.—The Mexican Ministry of Public Works is reported to be about to invite tenders for the construction of a dam at La Angostura in the Yaqui valley in order to form a storage lake with a capacity of 1,270,000 cubic metres to supply the water for six hydro-electric power stations with a total capacity of 123,000 kW.

Millom.—Undertaking Not to be Sold.—By six votes to two the Rural District Council has decided to take no action regarding a proposal by the South Cumberland Electricity Supply Co., Ltd., to acquire the Council's electricity undertaking.

North Wales.—Electrical Developments.—It was stated at the quarterly meeting of the North Wales and South Cheshire Joint Electricity Authority held at Llandudno recently, that the actual value of construction work now in progress within the area of the North Wales Power Company was £142,000. Added to this was the total cost of the new plant which was being installed at the Dolgarrog works, making the total approximately a quarter of a million pounds. Mr. G. K. Paton said the new 6,500-kW generating set had now been installed in the power station at Dolgarrog and was ready for commercial operation.

South Shields.—Change of Voltage.—Following the visit of a deputation to London recently it has been decided that the Corporation shall pay £7,000 to the Central Electricity Board as the town's contribution towards a scheme for changing the voltage from 2,200 to 11,000 V. It is understood that the plant, which will become the property of the Corporation under the scheme, will be worth approximately £9,000. An increase in the town's voltage is considered necessary as a preliminary to the Corporation's £200,000 scheme for reorganising the undertaking.

Stoke-on-Trent.—Supply to Norton.—The Electricity Committee has received permission to provide a supply of electricity to Norton.

MAINS AND SERVICES.—Application is to be made for sanction to the borrowing of a further sum of £150,000 for the provision of general mains and services within the City Council's area.

CHANGE-OVER.—The d.c. supplies in the Whieldon Road area are to be changed over to a.c.

SUB-STATIONS.—The Council has approved the purchase of a site at Meir, where 500 houses are being built on the Hillside estate, for the erection of a sub-station; a tender has been accepted for the erection of a sub-station at Townsend, Bucknall; and it has been decided to provide an out-door sub-station at Ball Green Lane, Norton, at a cost of £275.

STREET LIGHTING.—Considerable extension of the system of electrical illuminations of streets that has been provided experimentally will be carried out in Stoke-on-Trent in the near future if the proposition put forward to the Highways Committee by the Electricity Committee is approved.

TARIFF STANDARDISATION.—The City Council has adopted resolutions of the Electricity Committee which aim at a form of standardisation of tariffs throughout the North West Midlands area. The Committee had had before it a report of the Technical Committee appointed by a conference of electricity authorities in the area.

Stokesley (Yorkshire).—ONLY ELECTRICITY FOR YARM HOUSES.—A suggestion that gas should be installed in houses on the Yarm estate has been defeated, and the Rural District Council has decided to adhere to its previous decision to install only electricity.

Strathkinnes (Fifeshire).—STREET LIGHTING.—Following a decision by the St. Andrews Local Committee electric street lighting is to be introduced in the town.

Whitley Bay.—PROPOSED ILLUMINATIONS LEGISLATION.—The Urban District Council is to hold a meeting on November 6th to consider the draft of a Parliamentary Bill the purpose of which, among other things, is to secure sanction to spend public money on illuminations. The Bill is a result of a recent inquiry by the district auditor, when sixteen councillors were threatened with a £500 surcharge.

Traction

Austria.—A NEW AERIAL ROPEWAY.—An aerial ropeway has been opened for passenger traffic near Innsbruck, in the Austrian Tyrol. The length of the line is 3,971 yd., the lower station being at an altitude of 2,830 ft. and the upper one at 7,406 ft. The power plant for the upper and lower sections of the line is at the intermediate station at 6,251 ft. altitude. The electric drives of the two sections are independent of one another, each being provided with a 60-kW Brown-Boveri main motor in Ward-Leonard connection with a buffer battery. The power supply, from the Innsbruck Electricity Works, is at 5,000 V, which is stepped down by two transformers to 380 V for connection to the two control sets. The latter each comprise a 70-kW, three-phase induction motor, an 85 kW d.c. generator and an exciter. A 100-h.p. petrol-electric set is used as a standby.

China.—TROLLEY-BUS SCHEME.—According to a report from Shanghai, the Nanking Municipal Government is negotiating with the China Development Finance Corporation in connection with a proposal to operate trolley-buses in the city.

Denmark.—SUBURBAN ELECTRIFICATION.—The Director-General of the State Railways recently opened a new suburban service of electric trains from Copenhagen to Holte. This is the third section of a scheme for electrifying railways in the suburbs of Copenhagen, and work is now being put in hand on a fourth line (Copenhagen-Ballerup).

Holland.—FURTHER ELECTRIFICATION.—In addition to the comprehensive programme for the conversion to the standard 1,500-V d.c. system of the main lines in central Holland, the Netherlands Railways authorities have also decided to electrify the line from The Hague to Gouda and Utrecht, and this work has been put in hand.

India.—CALCUTTA TROLLEY-BUS PROPOSAL.—A request is being made to the Government to amend the Tramways Act so as to enable the Calcutta Tramways Company to run trolley-buses along Central Avenue and other routes.—*Indian Engineering.*

Municipal Supply Undertakings' Results

BELOW we publish a second table of municipal undertakings' results for the year ended March 31st last (the first appeared in the ELECTRICAL REVIEW of August 14th). Apart from the tabulated data, it is of interest that at Birkenhead there was an increase in sales of 40 per cent. to 14,677,402 kWh under the domestic tariff, a particularly attractive feature being the charge of 0.3d. per kWh above 500 kWh per quarter. There were 44,156 consumers at the end of the year, 80 per cent. of the premises in the area being connected to the supply network. Further, 6,300 appliances were issued, making 45,000 on hire or sold, including 16,000 irons, nearly 9,000 fires and 6,000 cookers. In the Aberdeen report mention is made of the replacement of a 5-ton G.V. battery vehicle which has been in constant service for seventeen years. The motor was found to be still in good condition. At South Shields the electrical engineer complains that the increase in rates (£1,615) is unjustified. The past year has been a successful one at Cardiff, the total output having increased by 12 million kWh, due mainly to the steelworks of Messrs. Guest, Keen & Baldwin. Power supplies increased at Clitheroe, and will do so much more extensively this year with the starting up of the new works of the Ribblesdale Cement Co., where the consumption is expected to reach 17½ million kWh per annum. There was an increase of 65 per cent. in the number of cookers in use, 3,089 being installed on hire, while the recently introduced scheme for the simple hire of wash-boilers proved successful. Despite the drop in revenue per consumer from £10 2s. to £10, the amount sold per head rose from 689 to 764 kWh. Corresponding figures for Halifax were 329 and 506 kWh and for Hornsey 609 to 641 kWh. At Halifax 2,900 new consumers were obtained, 1,000 of whom took advantage of the assisted wiring scheme; this brought the total to 19,840. The average price received per kWh was 0.98d. There was a 23 per cent. increase in the domestic tariff supplies, and at March 31st a total of 2,887 wash-boilers, 1,060 water-heaters and 5,954 cookers had been installed, there being one cooker in use for every 2.8 consumers.

At Ilford the domestic appliance load represented 93,126 out of a total of 127,824 kW. Cooking demonstrations were provided for schoolgirls, the boys being conducted over a substation with a view to making them electrically minded. A big increase in the number of small appliances connected at Hornsey is reported, but the cooker business was poor; new schemes have been introduced to remedy this. There were 1,468 new consumers at Bedford during 1935-36, and 83 per cent. of the urban premises and 68 per cent. of the rural premises were connected to the mains at the end of the year. At Bradford 4,681 new consumers were added, bringing the total to 51,061. The net increase in the output of 13,929,000 kWh was made up mainly of motive power (6,000,000 kWh) and special domestic tariff (4,700,000 kWh). The C.E.B. made considerably greater use of the station than in the preceding year, the increase in generation amounting to 47 per cent.

Town.	Engineer.	Total Revenue.		Working Expenses.		Net Profit.		Sales of Electricity. Thousands of kWh.		Sales of Electricity. Percentage Increase.
		1934/35.	1935/36.	1934/35.	1935/36.	1934/35.	1935/36.	1934/35.	1935/36.	
		£	£	£	£	£	£			
Aberdeen	W. Hodson (acting)	240,350	235,597	113,553	122,511	30,335	14,789	46,993	54,742	16.5
Accrington	A. W. Clegg	101,785	106,591	46,853	50,726	17,194	18,717	29,903	32,909	10.0
Barrow-in-Furness	H. R. Burnett	118,511	121,600	62,231	74,062	20,420	8,220	26,008	28,062	7.8
Bedford	R. W. L. Phillips	170,460	198,409	135,117	143,214	*16,638	*5,923	40,906	49,799	21.7
Bexhill	C. A. Frost	54,073	56,151	35,597	42,139	6,562	*74	6,610	7,135	7.9
Birkenhead	F. E. Spencer	276,998	293,164	180,854	207,123	5,263	5,560	45,956	53,786	17.0
Bradford	T. Roles	660,103	697,618	490,581	547,604	24,556	16,290	125,617	139,547	11.0
Bridlington	A. J. Beckett	36,101	39,999	19,140	20,808	5,890	9,035	2,737	3,428	25.2
Burnley	J. E. Starkie	117,437	123,438	73,209	76,903	14,231	14,246	17,180	17,486	1.7
Bury	J. G. Potts	126,267	128,472	104,462	106,172	5,186	5,708	31,815	30,830	−3.1
Cardiff	E. Jones	324,272	380,591	159,539	193,522	22,313	59,252	70,394	83,123	18.0
Clitheroe	A. H. Todd	20,489	24,358	11,255	14,388	2,037	2,191	2,430	3,135	29.0
Darwen	F. M. Fletcher	38,439	41,365	24,931	26,311	2,754	4,473	5,928	6,447	8.7
Derby	F. Nicholls	290,245	317,418	175,196	201,555	35,695	22,125	55,450	66,885	20.6
Douglas	B. Kelly	58,250	66,409	29,759	35,234	5,271	6,214	4,292	6,475	50.9
Eccles	†C. V. Johnson	62,553	68,569	43,091	45,784	6,630	10,050	11,107	12,418	11.8
Edinburgh	E. Seddon	859,808	919,539	653,413	697,775	35,001	30,752	159,382	190,236	19.3
Gillingham	H. Hall	86,033	92,374	67,299	71,465	18,135	2,548	17,527	19,033	8.5
Glasgow	H. Bell	1,173,596	1,235,332	777,047	823,157	33,083	57,805	310,402	357,692	15.2
Halifax	G. A. Vowles	209,068	214,651	146,895	147,662	19,016	25,126	44,512	49,673	11.5
Hornsey	F. C. Orchard	105,439	114,049	66,230	76,708	3,881	2,918	11,369	13,578	19.4
Ilford	G. F. Gregory	279,427	311,539	190,111	229,446	20,117	9,471	40,798	49,063	20.2
Islington	A. P. MacAlister	313,832	327,835	193,528	215,389	65,597	51,483	45,744	49,497	8.2
King's Lynn	C. W. Jackson	57,315	67,636	25,239	29,524	8,135	15,671	8,766	10,595	20.8
Kirkcaldy	O. F. Francis	40,720	42,305	25,004	30,595	*84	*046	7,634	8,547	11.9
Lancaster	G. C. Miles	111,985	140 790	69,284	83,140	19,679	26,434	‡27,766	‡32,602	17.4
Liverpool	P. J. Robinson	1,691,792	1,796,788	1,046,638	1,089,559	95,735	99,395	352,792	389,104	10.2
Tunbridge Wells	R. N. Torpy	135,208	141,733	79,852	82,967	18,960	22,387	26,458	30,340	14.0

* Net loss. † Appointed since the close of the financial year to succeed the late Mr. H. W. Angus. ‡ Excluding supplies to Morecambe.

London.—PLEA FOR "TUBE" EXTENSION.—The following statement has been issued by the London Passenger Transport Board: Representatives of the Camberwell and Southwark Borough Councils and of the Camberwell, Peckham and Dulwich Chamber of Commerce met Lord Ashfield to urge the extension of the Bakerloo Railway to Camberwell Green. Lord Ashfield received the deputation in his capacity as chairman of the Standing Joint Committee of the London Passenger Transport Board and the main line railway companies. Councillor J. Clarke (Camberwell Borough Council), Mr. F. W. Room (Camberwell, Peckham and Dulwich Chamber of Commerce), and Councillor L. J. Styles (Southwark Borough Council) argued the case for the tube. Lord Ashfield promised that he would take an early opportunity of discussing the subject with his colleagues on the Standing Joint Committee and that a prompt reply would be sent to the deputation. He stated that be believed the tube was needed and ought to be built, but they knew in 1931 that it would not be self-supporting. The 1¾ miles, together with an extension a little beyond Camberwell Green to provide space for storage, would cost £2,000,000.

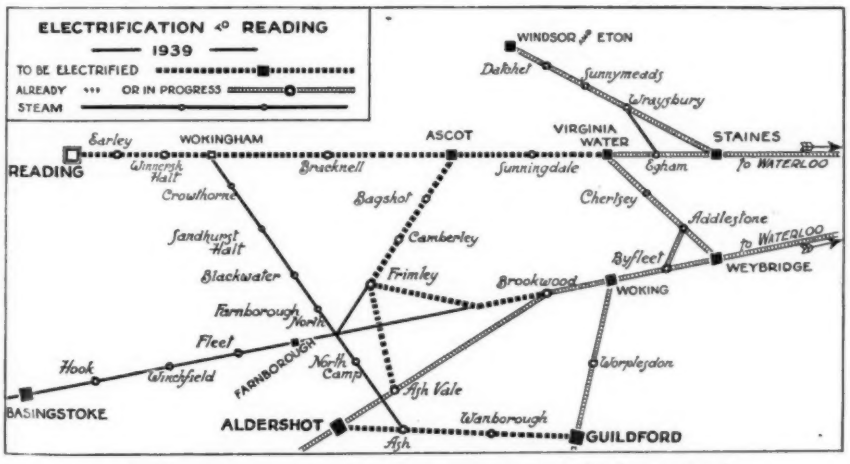
Merthyr Tydfil.—TRANSPORT SCHEME REJECTED.—At a recent meeting of the Town Council it was decided unanimously to reject a scheme for the taking over by the Rhondda Transport Co. of the whole of the transport system in the area.

Neasden (Middlesex).—RAILWAY DEPOT DEMOLITION.—Demolition of the old building at the Neasden Depôt is approaching completion. A contract has just been let for the new building, and construction will be begun shortly. The new depôt will be the largest in use by the London Passenger Transport Board, and will accommodate about 650 passenger vehicles. The buildings will have a total floor area of 260,246 sq. ft. and, including sidings, the depôt will cover 44 acres.

Reading.—SUCCESS OF TROLLEY-BUSES.—It was recently stated at a meeting of the Council that in the first 45 days that trolley-buses were used on the Caversham-Whitley route passenger journeys increased by 97,000. Longer fare stages were, however, an inducement to travel in addition to the comfort of the new vehicles.

South Shields.—TROLLEY-BUS SERVICE.—The Town Council's new trolley-bus service between the Market Place and Prince Edward Road was started recently with four vehicles. This is the first section of the Council's scheme for converting tram routes to trolley-bus services. Work on the erection of the overhead equipment for the second section has not yet started, and it will be some time before the second stage is inaugurated. The whole change-over is estimated to cost £40,000.

Southern Railway.—ANOTHER BIG ELECTRIFICATION PROJECT.—The Southern Railway has decided to continue the electrification of its outer suburban system as far as Reading, and at the same time complete various smaller sections in the Aldershot and Guildford areas. Altogether 43 route miles are involved, with an equivalent track mileage of 88. The cost will be nearly £1,000,000, and it is hoped that the work will be completed by 1939. The lines to be electrified are:—Virginia Water to Reading, *via* Ascot; Ascot to Ash Vale Junction; Frimley Junction to Pirbright Junction; and Aldershot North Junction to Guildford. The stations involved are:—Sunningdale, Bagshot, Ascot, Camberley, Bracknell, Frimley, Wokingham, Ash Vale, Winnersh Halt, Ash, Earley, Wanborough, Reading and Guildford. Aldershot, Brookwood, Woking, &c., are included in the scheme already in progress, in connection with the electrification of the main line to Portsmouth.



(Route map of the latest Southern Railway electrification proposals)

Sweden.—ELECTRIFICATION.—The electrification of the privately owned railways connecting Gothenburg with the Norwegian frontier *via* Mellerud and Kornsjö will probably be carried out soon, learns *Reuter's Trade Service* from Stockholm, the Government having granted a concession for this electrification. The programme of electrification work on the State Railway lines so far authorised is expected to be completed by about the end of the current year. The cost has been lower than was expected, the amount saved being about Kr. 3,230,000. The Railway Board wishes to use Kr. 2,800,000 of this to purchase thirteen more electric locomotives and three transformers.

United States.—POPULARITY OF TROLLEY-BUSES.—Commenting on the continued increase in the number of trolley-buses in use, *Mass Transportation* states that approximately 600 (including all-service vehicles) will be delivered or placed on order this year. This will equal the total number of such vehicles previously in operation. No other type of passenger transport vehicle has ever approached this rate of growth, it states. In practically every instance the traffic on the new trolley-coach routes has been in excess of the original estimates, necessitating additional equipment to provide an adequate service. The vehicles themselves have been greatly improved. Wiring has been simplified and apparatus is more accessible for maintenance and inspection.

Communications

Germany.—WEATHER CHARTS BY TELEVISION.—According to an *Exchange* message from Berlin, experimental transmissions of weather charts to air pilots by television are being made.

Great Britain.—BEAM WIRELESS ANNIVERSARY.—Last Sunday marked the tenth anniversary of the opening of the first Empire beam wireless service, namely, between stations at Bodmin and Bridgwater in this country and Yamachiche and Drummondville in Canada. The Anglo-Canadian service was shortly followed by further Empire services to South Africa, Australia and India, and led to the Imperial Wireless and Cable Conference when the British and Dominion Governments recommended the consolidation of the Imperial overseas telegraph services which were placed under the control of Cable & Wireless, Ltd., which now operates a world-wide network of wireless services and more than one-half of the total submarine cable mileage in existence.

Lithuania.—AUTOMATIC TELEPHONE EXCHANGE.—A *Reuter* report from Kaunas states that a new automatic telephone exchange which has been established by the Automatic Electric Co., Ltd., Liverpool, was officially inaugurated last week.

Sweden.—BROADCASTING DEVELOPMENTS.—The Swedish Post Office recently published a special report on the technical organisation and development of broadcasting in Sweden. The network to-day comprises over thirty stations, most of which are interlinked by cable; in the north-east, however, a system of small beam transmitters is being used for the purpose of relaying the Stockholm programme. The P.O. has planned to modernise a number of stations and to substitute higher powered transmitters. Work is already in progress on a new 100-kW regional station near Hörby, in South Sweden, and work will shortly be commenced on a 10-kW station near Ulea, in the north. Short-wave broadcasting equipment has been ordered from a Stockholm firm for a new station near Motala.

United States.—PLUG-IN TELEPHONES.—A novel telephone still in the experimental stage has been demonstrated in New York, states *Reuter's Trade Service*. By means of it a person plugging into the nearest electric light socket can talk with another person plugging into a socket near at hand. Operation is on the principle of carrier-currents superimposed on the electric light wires. The receiving 'phone has a loudspeaker with natural volume and tone reproduction. Each set weighs about 5 lb. This new system of intercommunication is being evolved by the American Carrier Call Corporation.

Yugo-Slavia.—NEW BROADCASTING STATION.—After protracted negotiations the Marconi Company has secured an order for the supply of a 20-kW broadcast transmitter to be installed near Belgrade. This transmitter will replace the existing low-power station which has been in service for seven years.

TELEPHONE SYSTEM IMPROVEMENTS.—The Yugoslav Post Office authorities have decided upon a scheme for the extension of the telephone systems at Belgrade, Zagreb and Ljubljana. According to present arrangements, two new automatic telephone exchanges will be constructed at Belgrade, one with 2,000 and the other with 1,000 lines. An exchange with 1,000 automatic telephones will be built at Zemun and another with 500 at Pancevo. Both the underground cable and overhead wire systems will be improved at Belgrade. At Zagreb and Ljubljana the existing telephone systems will be enlarged and improved along similar lines. In addition, new high-frequency lines will be established between Yugoslavia and Greece, Bulgaria, Rumania, Czechoslovakia and Italy.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Barnstaple.—November 16th. Corporation. One 10-ton overhead crane for the power station extensions, Castle Street. (October 23rd.)

Birkenhead.—November 16th. Corporation. Electrical materials for one year. (See this issue.)

Birmingham.—November 9th. Electric Supply Committee. Meters for six months. (See this issue.)

Blackpool.—November 20th. Borough Council. Twenty single-deck tramcars complete, or alternatively of bodies, trucks and electrical equipment. General manager, Transport Department, Blundell Street.

Canada.—WINNIPEG.—November 9th. Administration Board of the Greater Winnipeg Sanitary District. Convertible gas engine generator sets and a Diesel engine generator set, including auxiliaries, &c. (T.Y. 2080.)*

Chesterfield.—November 12th. Electricity Committee. Equipment for the extension of one 33,000-V outdoor sub-station, complete with switchgear, transformer, and induction regulator; also three miles of h.v., p.i., l.c., and armoured cable, with pilot cables. (See this issue.)

Dewsbury.—November 2nd. Corporation. Electric wiring of ninety-four houses at Earlsheaton. Borough electrical engineer, Bradford Road.

East Barnet.—November 16th. U.D.C. Six electrically operated, horizontal-spindle, centrifugal pumping units and two electrically operated, vertical-spindle, centrifugal pumping units. C. M. Barnes, engineer, Town Hall, Station Road, New Barnet, Herts (deposit £5 5s.).

Edinburgh.—November 4th. City Council. One motor-driven circulating water pump with valves, expansion pieces and two chain-grate mechanical stokers to be fitted to existing boilers at the Portobello power station. (October 16th.)

Fife.—November 2nd. County Council. Electric lighting in forty houses at Comrie. C. R. Douglas & Son, surveyors, 15, East Port, Dunfermline (deposit £1 1s.).

Glasgow.—November 17th. Corporation. 25,000-kW steam turbo-alternator, with condensing plant and auxiliaries. (See this issue.)

November 5th. Corporation. Electrical installations in eighty-six houses on the Crail Street estate. Town Clerk's Office (Room 36).

Harrogate.—November 14th. Electricity Committee. Three 750-kVA, oil-cooled, outdoor type transformers, and one seven-panel, 150,000-kVA switchboard. (October 16th.)

Hastings.—November 12th. Borough Council. Transformers, poles, stay blocks and steelwork, &c., for overhead lines, during one year. (See this issue.)

Hornsey.—November 4th. Electricity Supply Department. A.c. and d.c. meters, demand indicators, load controllers and time switches. (See this issue.)

Hull.—November 4th. Committee for the Care of the Mentally Defective. Electrical installation at the Colony for the Care of Mentally Defective, Winestead. D. Harvey, city architect, Guildhall (deposit £1 1s.).

Irish Free State.—December 15th. Electricity Supply Board. 110,000-V transmission line between Dublin and Dundalk. (October 16th.)

Keighley.—November 4th. Electricity Committee. Erection of a h.v. overhead line in the Oakworth district (the Corporation will supply and deliver on site all materials required). H. Webber, borough electrical engineer and general manager, Electricity Offices, Coney Lane.

Kirkcaldy.—November 9th. Town Council. Electric lighting, heating, power, and call-bell installation at the new fire station buildings. Burgh electrical engineer, Electricity Works, Victoria Road.

London.—BETHNAL GREEN.—November 13th. Borough Council. One 1,000-kVA transformer, with on-load auto-tap changing device and one ring main tee-off isolating equipment. (See this issue.)

Manchester.—November 5th. Electricity Committee. A.c. electric fan motors for the period ending December 31st, 1937. (October 23rd.)

November 11th. Automatic telephone equipment at the Town Hall, power stations, &c. (October 23rd.)

November 6th. L.p. water valves and pipework at Barton power station, and switchgear for various sub-stations during one year. (October 23rd.)

November 27th. Two 130,000-lb. per hr. boilers, economisers, &c., for the Stuart Street power station. (See this issue.)

Middlesex.—November 30th. County Council. Electrical bed, passenger, and goods and service lifts in the extensions at Redhill County Hospital, Edgware. (See this issue.)

November 26th. Electrical installations in connection with the extensions at the Southall Technical College. (See this issue.)

Moffat.—November 16th. Town Council. Electrical installation at housing estate. Town clerk.

Northern Ireland.—BELFAST.—November 14th. Electricity Committee. Battery-driven electric vehicles; 6.6-kV armour-clad switchgear, and centrifugal oil purifying equipment with pipework. (See this issue.)

Ormskirk.—November 9th. U.D.C. Electrical pumping plant at the Greetby Hill waterworks. J. Haydn Thomas, clerk to the Council, Council Offices (deposit £3 3s.).

Otley.—October 31st. U.D.C. Wiring of 205 houses on the Newall Garden Suburb estate. C. F. Hodgson, surveyor, Council Offices.

Radcliffe.—November 16th. Electricity Department. 200-, 300- and 500-kVA transformers. (October 23rd.)

Rochdale.—November 24th. Electricity Committee. Quarterly and prepayment meters for twelve months. (October 23rd.)

St. Helens.—November 12th. Electricity Department Salt glazed, stoneware ducts and cable protection tiles; and h.v. and l.v. p.i. cables. (See this issue.)

Stoke-on-Trent.—November 11th. Electrical Engineer's Department. 600-Ah, 60-cell battery at Hanley sub-works. (See this issue.)

South Africa.—PRETORIA.—November 6th. Union Tender and Supplies Board. Telegraph and telephone line material. (T. 30856.)*

PORT ELIZABETH.—November 12th. Municipality. Transformers, kiosks, cables, switchgear, street lighting fittings, lamps, &c. (T.Y. 30859.)*

CAPE TOWN.—December 18th. Cape Hospital Board. X-ray equipment at the Groote Schuur Hospital. (October 16th.)

STELLENBOSCH.—December 1st. Municipality. H.v. cables, cable boxes and transformers. (T.Y. 30891.)*

Thurrock.—November 11th. U.D.C. 110-kW alternator, switch and control gear, and interconnections between main and auxiliary equipment at the main drainage works, Marsh Farm, West Tilbury. (See this issue.)

Tynemouth.—Town Council. Electrical installations at the new ice factory and offices, Bell Street, North Shields. Borough engineer, 19, Howard Street, North Shields.

Uruguay.—MONTEVIDEO.—December 8th. State Electricity Supply and Telephones Administration. Porcelain insulators, switches, cut-outs, lampholders, &c. (T.Y. 30875.)*

November 19th. Switch cabinets for long-distance telephone lines, distributors, wiring, &c. (T.Y. 30880.)*

Walsall.—November 2nd. Electric Supply Committee. Electricity supply equipment and domestic apparatus for one year. (October 16th.)

West Ham.—November 9th. Electricity Department. Coal for power station for one year. (October 23rd.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Bedford.—Electricity Committee. Recommended. Fire protective apparatus at fire station and sub-stations (£2,407).—Foamite Firefoam, Ltd.

Bradford.—Electricity Committee. Recommended. Fire extinguishing apparatus for the Valley Road power station.—Walter Kidde & Co. 500-kW mercury arc rectifier equipment for the Dudley Hill sub-station.—B.T.H.

Cannock.—U.D.C. Accepted. Wiring thirty-six houses in Mosswood Street, Cannock, four in Heath Street, Hednesford (£209), and sixteen in Platt Street, Hightown (£93).—H. Corfield.

Colchester.—Education Committee. Accepted. Electric lighting at Old Heath schools (£181).—Central Electrical Co. (Colchester), Ltd.

Dundee.—Corporation. Accepted. Electric lighting installation at the Beechwood housing estate (£1,263).—Stenson & Co.

East Ham.—Electricity Committee. Recommended. Cable for twelve months.—Enfield Cable Works, Ltd.; Liverpool Electric Cable Co.

Kettering.—Electricity Committee. Recommended. Automatic fire protection equipment (£177).—Walter Kidde & Co. Three 250-kVA transformers (£168 each).—Brush Electrical Engineering Co.

London.—HACKNEY.—Housing and Town Planning Committee. Electric lighting and power at the Rossington Street housing estate :—

	£		£
F. H. Wheeler & Co. Recommended	**382**	Greene & Son	645
Holliday, Hall & Stinson, Ltd.	423	E. C. Porter, Ltd.	654
W. Dennison & Son	424	District Electric, Ltd.	783
		Sellcon Electrical Co.	855

STEPNEY.—Electricity Supply Committee. One 500-kVA transformer fitted with automatic voltage regulation :—

	£		£
Hackbridge Electric Construction Co.	527	Bruce Peebles & Co.	556
Ferranti, Ltd. Recommended	**556**	General Electric Co.	556
Met.-Vick. Elecl. Co.	556	Johnson & Phillips, Ltd.	556
British Thomson-Houston Co.	556	Foster Engineering Co.	556
C. A. Parsons & Co.	556	English Electric Co.	556
Fuller Electrical & Mfg. Co.	556	Electric Construction Co.	565

One l.v., oil circuit-breaker, with 6-way, 3-phase, 4-wire, unit type distribution board :—

	£		£
G. E. C. Recommended	**225**	Met.-Vick. Elect'l Co.	301
W. Lucy & Co.	243	A. Reyrolle & Co.	320
English Electric Co.	276	Johnson & Phillips, Ltd.	321

FULHAM.—Electricity and Lighting Committee. Recommended. "Mulsifyre" system of fire protection at the new power station (£3,215), and an additional steam pump (£1,800). —Mather & Platt, Ltd. Spare parts for the boilers at the new station (£2,561).—Stirling Boiler Co. Heating and ventilation equipment at the Central sub-station (£705).—Bastian & Allen, Ltd.

HAMMERSMITH.—Electricity Committee. Recommended. Pressure testing transformer, regulator, rectifier, and voltmeter for tests on bus-bars and other apparatus in the generating station (£200).—Ferranti, Ltd. Three 150-kVA transformers for the kiosks at Shepherd's Bush Common and Jeddo Road (£371). —British Electric Transformer Co.

ST. PANCRAS.—Contracts and Stores Committee. Accepted. A.c. motors to replace d.c. motors in connection with the changeover (£184).—City Electrical Co. 500 yd. of 600-V, p.i., l.c., and unarmoured cable (£307).—Metropolitan Electric Cable & Construction Co.

Recommended. Switchgear for the Camberley House sub-station.—A. Reyrolle & Co. (£793); English Electric Co. (£887).

Liverpool.—Clarence Dock Power Station (Special) Committee. Recommended. Two rotating cranes and grabs at the Clarence Dock power station (£11,388).—Babcock & Wilcox, Ltd. In consequence of the modification of the feed-heating system to be installed under the 1937-38 extensions, it is proposed to make slight alterations in the specifications of the tenders which have been accepted. The revised figures are: 50,000-kW turbo-alternator with auxiliaries (£180,515).—Met.-Vick. Elecl. Co. Three water-tube boilers (£251,332).—Babcock & Wilcox, Ltd. Three electrical boiler feed and lift pumps (£9,808).—Mather & Platt.

Passenger Transport Department. Accepted. Fifty car sets of bogie trucks, including brakes (£561 per set).—E.M.B. Co. Fifty sets of electrical equipment, including four motors complete for each car (£602 per set).—G.E.C. Fifty sets of control gear, including controllers, resistances, circuit-breakers, &c. (£303 per set).—Met.-Vick. Elecl. Co.

Luton.—Town Council. Accepted. Electric wiring at the police station and quarters (£908).—Shoolbred Electrical Co.

Manchester.—Electricity Committee. Accepted. Steam receiver at the Barton power station.—Aiton & Co. One 10,000-kVA transformer at the Dickinson Street station—Ferranti, Ltd. Flue gas ducts for No. 13 boiler at the Barton station—Simon-Carves, Ltd. One 2,000-kVA transformer at the Barton station. —Met.-Vick. Electl. Co. H.p. steam pipes, feed and circulating water pipes at the Barton station.—Babcock & Wilcox, Ltd. Cable during the period ending June 30th, 1937.—Derby Cables; Hackbridge Cable Co.; Metropolitan Electric Cable & Construction Co.; Standard Telephones; Telegraph Construction & Maintenance Co.; Connollys (Blackley), Ltd.; Henley's; W. T. Glover & Co.; Mersey Cable Works, Ltd.; Ward & Goldstone; Macintosh Cable Co.; Pirelli General Cable Works. 6,600-V sub-station switchgear during two years.—Ferguson, Pailin, Ltd.

Education Committee. Accepted. Electrical installations at the Brownlow Green School.—H. C. Taylor & Co. Electric bed lifts at Memorial Homes.—W. Wadsworth & Sons. Electrical work at the Elmfield school.—H. Hassell & Co.

Middlesbrough.—Town Council. Accepted. Electric power installations at the Transport Department.—Warren Bros.

Electric cables. Macintosh Cable Co.; Enfield Cable Works, Ltd.; B.I. Cables, Ltd.; Hackbridge Cable Co.

Middlesex.—County Council. Accepted. Electrical installation at second section of the Shenley Mental Colony (£22,487).—Read & Partners, Ltd.

Health Committee. Accepted. Electrical work at the operating theatre, Clare Hall Sanatorium (£150).—Read & Partners, Ltd.

Newcastle-upon-Tyne.—City Council. Accepted. Electrical installations in two schools (£441).—Amos Spalding.

Paisley.—Town Council. Accepted. Electrical work at 782 houses.—W. A. S. Lang & Co.

Salford.—Electricity Committee. Recommended. 5,000 yd. of four-core, 1,000-V, p.i., l.c. cable (£642 per 1,000 yd).—N.V. Nederlandsche Kabelfabriek.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, November 5th. Institution, London, W.C.2. 6 p.m. "The Effects of Impulse Voltages on Transformer Windings." Messrs. T. E. Allibone, D. B. McKenzie and F. R. Perry.

Mersey and North Wales (Liverpool) Centre.—Monday, November 2nd. The University, Liverpool. 7 p.m. Kelvin Lecture. "The Transmutation of Matter by High-Energy Particles and Radiations." Mr. J. D. Cockcroft. Friday, November 6th. Reeces', Parker Street, Liverpool. Benevolent fund dance.

North-Western Centre.—Tuesday, November 3rd. College of Technology, Manchester. 7.30 p.m. "Cineradiography." Dr. Russell J. Reynolds.

North-Eastern Centre.—Wednesday, November 4th. Literary and Philosophical Society, Newcastle-upon-Tyne. 7 p.m. Faraday Lecture. "Television—An Outline." Mr. E. Mallett. Friday, November 6th. Literary and Philosophical Society, Newcastle-upon-Tyne. 7 p.m. Joint meeting with the North-East Coast Institution of Engineers and Shipbuilders. Parsons Memorial Lecture. "Sir Charles Parsons and Steam." Sir F. E. Smith.

Transmission Section.—Wednesday, November 4th. Criterion Restaurant, London, W.1. 8 for 8.30 p.m. Conversazione and dance.

Meter and Instrument Section.—Friday, November 6th. Institution, London, W.C.2. 7 p.m. Chairman's address by Mr. G. F. Shotter.

Birmingham Electric Club.—Friday, October 30th. Grand Hotel, Birmingham. 7 p.m. "Motor Car Electrical Equipment." Mr. E. A. Watson.

Faraday House Old Students' Association.—Friday, October 30th. Savoy Hotel, London, W.C.2. Annual dinner.

Institution of Chemical Engineers.—Friday, October 30th. Institution of Civil Engineers, London, S.W.1. 6.30 p.m. "Research at the Lowest Temperatures and its Importance to Industry." Prof. F. A. Lindemann.

Royal Institution.—Friday, October 30th. Institution, London, W.1. Conversazione.

Society of Engineers.—Monday, November 2nd. Burlington House, London, W.1. 6 p.m. "Some Aspects of Cultivation and Other Power Operations on the Farm." Dr. B. A. Keen and Mr. G. H. Cashen.

Electrical Association for Women.—Tuesday, November 3rd. 20, Regent Street, London, S.W.1. 3 p.m. "Housing and Town Planning." Mr. J. G. Martin.

Electrical Power Engineers Association *(London Technical Group).*—Tuesday, November 3rd. Caxton Hall, London, S.W.1. 7.15 p.m. "Lubricating Oils." Mr. R. Evans.

Institution of Civil Engineers.—Tuesday, November 3rd. Institution, London, S.W.1. 6 p.m. Address by Sir Alexander Gibb, president.

Edinburgh Electrical Society.—Wednesday, November 4th. Philosophical Institute, Edinburgh. 8 p.m. "Some Notes on Power Transmission." Mr. W. Guthrie.

Institution of Heating and Ventilating Engineers.—Wednesday, November 4th. Institution of Mechanical Engineers, London, S.W.1. 7 p.m. "Panel Warming Calculations." Mr. H. Bruce.

Royal Society of Arts.—Wednesday, November 4th. John Street, Adelphi, London, W.C.2. 8.30 p.m. "180 Years of Pioneer Work by the Society." Col. Sir Henry McMahon.

Notes

Aluminium Alloy Castings

The British Standards Institution has recently published the following three specifications: No. 702-1936. Silicon Aluminium Alloy Castings for General Engineering Purposes; No. 703-1936. Y-Alloy Castings (as cast) for General Engineering Purposes; and No. 704-1936. Y-Alloy Castings (Heat-treated) for General Engineering Purposes. These specifications apply to a wider field than British Standard Aircraft Specifications L.33, 2 L.24 and L.35 with which they are generally in accord; although less stringent in some respects. The principal differences are that the aluminium used in the alloy may be of 98 per cent. purity as well as 99 per cent., and the repair of slight defects, not affecting the suitability of the casting for its designed duty, is permitted subject to the purchaser's sanction. Provision is also made for a porosity test to be carried out when the purchaser asks for it; the nature of the test, the test pressure, and the testing fluid are left to agreement between him and the manufacturer. Copies of these specifications may be obtained from the Publications Department, B.S.I., 28, Victoria Street, S.W.1, 2s. 2d. each post free.

An Electric Crematorium

The first electric crematorium in Great Britain, at Stonefall Cemetery, Harrogate, was recently dedicated by the Bishop of Ripon. The building, of late 14th-century Gothic style, comprises a chapel with the crematorium on the wing, and is to the design of Mr. L. H. Clarke, deputy borough engineer. The crematorium furnace being housed in the same building as the chapel, from which it is divided by only a door, calls for absolute silence in operation. The chimney just projects through the roof, but no smoke is emitted, as cremation is not carried out by burning but by the action of hot air in a "Birlec" furnace preheated to a temperature of 600 deg. C. The supply to the preheating elements is switched off when the coffin is inserted, when the only electricity used is for exhausting the air. Cremation is completed in about one hour and a half. Tests were previously carried out with a pine box 72 by 19 by 19 in., which was heavier than a coffin and was filled with animal parts, about 15 stones in weight, representing something more severe than is likely to be met with in practice. The tests took place in the presence of Mr. N. McLean, borough electrical engineer, and under the direction of Mr. J. H. Crossley, sales manager and engineer of Birmingham Electric Furnaces, Ltd.

"Hands off Distribution!"

The opinion that the Government should keep its hands off the electricity distribution industry and allow it to get on with its job of meeting the ever-increasing public demand was expressed by Mr. C. C. Heathcock, manager and secretary of the Midland Electric Corporation for Power Distribution, Ltd., on October 23rd, in proposing a toast to the Electrical Power Engineers' Association at the annual dinner-dance of the North-West Midland Section at Wolverhampton. At this time, when all the brains of the industry ought to be used to meet the growing demands for electricity, some of the best in the industry were engaged, and almost fully engaged—he nearly said wasting their time—in designing hypothetical stations. Now the industry was faced with possible legislation concerning distribution. Personally, he could see nothing but trouble ahead if new legislation was forced on the industry. Mr. J. F. Sarvent, president of the Association, responded to the toast.

The Electrical Engineers' Ball

The Electrical Engineers' Ball for 1937 will be held at Grosvenor House, Park Lane, W., on Friday, February 5th, the day after the annual dinner of the Institution of Electrical Engineers. The details are being settled by the Executive Committee which is doing all it can to ensure the comfort of guests, both as regards dancing and supper. Tickets will be one guinea each and will be obtainable as usual from members of the General Committee, whose names will be announced in due course. Any surplus remaining after defraying the cost of the ball will be handed over to the I.E.E. Benevolent Fund.

Starting a 2,000-h.p. Squirrel Cage Motor

The fact that squirrel-cage motors give rise to a very heavy current rush when starting has greatly restricted the use of large motors of this type. They are usually started at reduced voltage which means a considerable lowering of the starting torque. A 2,000-h.p., 3,000 r.p.m. machine which is actually started by switching direct to full voltage is coupled to a turbo-compressor at the Hirschbach pit in the Saar mining area. The original machine was a slip-ring motor with a brush lifting and short-circuiting device. In view of numerous breakdowns, resulting from the severe conditions of operation and entailing costly repairs, it was decided to accept an offer to rewind the stator by Messrs. E. Haefely, of Basle, and a new rotor was supplied by Oerlikon, Ltd., of the double-cage type with outer cage for starting and inner cage for normal service. The motor is fed through the same 2.000-kVA transformer as before, and three small reactance coils which protected the stator winding of the old motor have been retained. The output available in the system to which the motor is connected varies from 76,000 kW when the mines are in full operation to 27,000 kW on non-working days. The reactance on the system during the starting period has proved to be well within the limits anticipated and the machine has been started perfectly well merely by closing a circuit-breaker as many as six times in succession within 10 to 15 minutes, when the system was fully loaded.

E.P.E.A. Dinner

At the annual dinner of the North of Ireland Section of the Electrical Power Engineers' Association, held at Belfast on October 9th, Mr. J. E. Jones, presiding, the toast of "The Association" was proposed by Mr. T. T. Partridge, superintendent engineer, G.P.O. Engineering Department, Northern Ireland, in the course of which he said that in Northern Ireland in the past few years there had been a larger increase in the supply and distribution of electrical power than in any other part of Great Britain. Mr. J. F. Sarvent, president of the Association, in responding, said that while the Association was a protective body, it was not a selfish one. He went on to speak of the cross-Channel work of the National Joint Board, and mentioned that both Belfast and Londonderry Corporations accepted the decisions of that body. There was no board in Northern Ireland and he thought that the formation of one would be a distinct advantage. Mr. H. Weston, vice chairman, Northern Ireland Section, Mr. A. W. Ferguson, chief administrative officer, Northern Ireland E.S.B., and Mr. C. M. Cooper, hon. secretary, also spoke.

The Engineering Institute of Canada

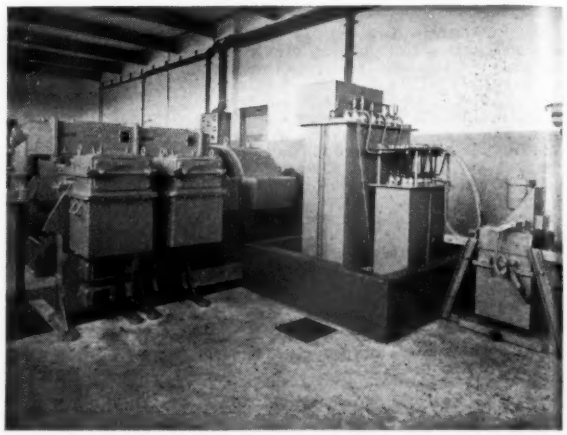
The Engineering Institute of Canada announces in its official organ that plans are well advanced for the celebration of its fiftieth anniversary in June next year, and invitations have been sent to seventy engineering societies throughout the world. The celebrations will be held in Montreal and Ottawa.

Water Pipes for Earthing

The Research Committee of the Institution of Civil Engineers has noted "many cases" of corrosion of water mains being attributed to, and in some cases proved to be due to, the use of such pipes for electrical earthing purposes. It also declares that there have been instances in which electric shocks have been incurred during the repair of water mains. While it is generally acknowledged that continuous current causes electrolytic corrosion where it leaves a metal conductor or pipe to earth, there is some doubt about the action of alternating current. In view of the importance of the subject a sub-committee has been set up with the approval and collaboration of the Institution of Electrical Engineers, the Institution of Water Engineers and the Water Associations to investigate the matter.

A Dutch Electrical Laboratory

Provision is made for testing a wide variety of electrical apparatus and also for experimental work in the new laboratory of the Hazemeijer Company at Hengelo, Holland. As there is little or no construction at more than 150 kV in Holland, a maximum test voltage of 500 kV was considered sufficient. The variety of uses to which the laboratory is to be put, however, made a particularly complete set of measuring apparatus necessary. The two air-cooled transformers are arranged so that they may be connected either in series or parallel; they are rated at 150 kVA each, stepping up to 250 kV. The use of the air-cooled type is intended to facilitate tapping for various voltages. The primary winding is double, each section being calculated for 220 V. They are fed from two 175 kVA generators at 220 V. When running without load the field current is 18 A, while the short-circuit current is about 1,500 A, or 3.2 times the normal current. The two generators are driven together by a 120-h.p., 4,000 V synchronous motor. The connections between the transformers and the generators are such that by the use of either one or two transformers in series, fed by one or two generators in parallel, it is possible to obtain a number of different short-circuit voltages. A resistance of 500,000 ohms is used to limit the current during flash-over tests. Each of the transformers is provided with a commutator rectifier driven by a synchronous motor, the stator of which is moveable. These permit the production of a pulsating d.c. of about 700 kV. This is taken to a battery of condensers, four of which (of 0.02 μF each) have now been installed after test at 300 kV. Liquid resistances are provided between the condensers and the transformers to protect the transformer windings. The voltage is measured by means of a spark gap. In order to be able to read the voltage during regulation a voltmeter placed in the low voltage circuit is used which causes a light to move over a scale 15 ft. long. Later on it is intended to install a high-voltage oscillograph. There are instruments which permit of the measurement of losses during insulator tests up to 120 kV. For short-circuit tests there is also an electro-magnetic oscillograph.



Low-voltage short-circuit testing equipment at the Hazemeijer laboratory. The switchgear is stamped "Systeem Reyrolle"

Opening of the North Wilford Extension

There were more than 200 people present at the luncheon held at the Nottingham Council House after the formal opening by Alderman E. Huntsman of the extension of the North Wilford station described on page 593. Sir Percival Bower (Birmingham), in proposing the health of the "Lord Mayor and Corporation of Nottingham," expressed the view that while there might be imperfections in the grid system, the idea behind it was sound. The Lord Mayor (Sir A. Ball) briefly responded. Mr. J. W. Beauchamp (commercial manager, C.E.B.), in submitting the toast of "The Electricity Undertaking," said that the Central Electricity Board was now two-thirds of the way towards solving its trading difficulties. Undertakings would come to realise that the Board was not a new department with whom they could drive bargains, but a steward for all generating stations, and that when dealing with it they were really dealing with one another.

Ald. E. Huntsman, in his reply, recalled that before the formation of the Central Electricity Board he had said that Nottingham would be willing to help if a larger scheme for the generation of electricity should develop. The undertaking was now supplying electricity, by means of the grid, over a much wider area than that for which it was immediately responsible. Mr. G. H. T. Taylor (International Combustion, Ltd.) and Mr. J. C. Wilson (B.T.H. Co.) replied to the toast of the contractors which had been proposed by the Sheriff (Coun. E. Mitchell).

Mine Fans

The British Standards Institution has just issued a specification for the testing of mine fans. It includes formulæ and definitions together with recommendations regarding the measurement of pressure, air velocity and power. Examples are given of a maker's specification of the performance of a mine fan, and of the method of reporting a fan test report. Copies of this specification (No. 707-1936) may be obtained from the British Standards Institution, Publications Department, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Appointments Vacant

Assistant installation inspector and assistant sub-station engineer for Hornsey Electricity Department.

Technical assistant (Meter Department) for the London and Home Counties J.E.A.

Assistant cookery demonstrator and showroom attendant (female) for Ealing Electricity Department.

Installation inspector and tester for Hove Electricity Department.

Static sub-station attendants for Dorchester Electricity Department.

Sales engineer for Bedford Electricity Department.

Electrical engineering assistants in the drawing office of the Air Ministry.

Plumber-jointer for Eccles Corporation.

Demonstrator saleswoman for Erith Electricity Department.

Electrician (wireman) for Weymouth and Melcombe Regis Electricity Department.

Traffic signal superintendent for St. Marylebone Borough Council.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. Coppock, who has been appointed to look after the North of England sales of Moffats, Ltd., Blackburn, has resigned his position as manager of the electrical showrooms of the Burnley Corporation. He had been in the service of the Electricity Department for twenty-three years, during eleven of which he was showroom manager.

[*Vandyk*

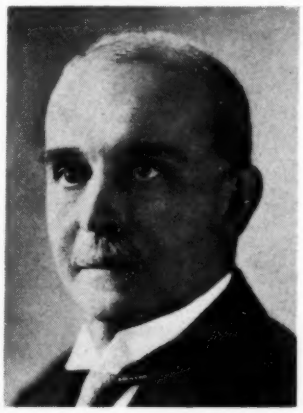
Mr. W. T. Griffiths, M.Sc., F.I.C., F.Inst.P., manager of the Research and Development Department of the Mond Nickel Co., Ltd., whose new laboratories are described in this issue

Mr. J. C. Bennett, engineer-in-charge with the Liverpool Corporation Electric Supply Department, has retired on superannuation.

Mr. E. M. Cottrell, chief wayleaves officer to Preston Corporation electricity undertaking, who has recently retired, has been presented by the staff and workmen with a wallet of notes. The presentation was made by Mr. D. Adams, borough electrical engineer. Mr. Cottrell joined the National Electric Supply Co. in 1894 as mains foreman, and later was appointed mains superintendent. When Preston Corporation purchased the undertaking he was responsible for the erection of overhead lines and subsequently became chief wayleaves officer.

Mr. W. Frisby, borough electrical engineer at Colchester for twenty-six years, has been presented with a grandfather clock by the staff and employés on his retirement.

Mr. R. O. Wright, manager of the Gravesend Works of W. T. Henley's Telegraph Works Co., Ltd., since their establishment in 1906, retired on October 23rd. He is succeeded by **Mr. E. E. Judge,** who has been assistant works manager since 1919. From 1886 to 1889 Mr. Wright studied at the Polytechnic School of Engineering under Professor Spooner, and then served an apprenticeship with W. H. Allen & Co., Lambeth, now W. H. Allen, Sons & Co., Bedford. He remained on their engineering staff until 1894, when he joined James Simpson & Co., Ltd., manufacturers of pumping engines, at their Pimlico Works. He entered Henley's service in February, 1898, and was appointed assistant works manager to the late Mr. R. J. Hatton at North Woolwich. Six years later he surveyed the site for the contemplated Gravesend works, and was mainly employed at that time with plans for the buildings and machines. A presentation to Mr. Wright was made at Gravesend Works on Tuesday last by Sir Montague Hughman, supported by Mr. W. F. Bishop, Mr. E. E. Judge and many other prominent members of Henley's staff, both from the works and head office. Mr. Judge presided and said the company had met to wish good health and every possible happiness to Mr. and Mrs. Wright. Mr. Wright was a man of sterling character and sound judgment, a clever engineer, respected and admired. He was the embodiment of kindness and consideration.

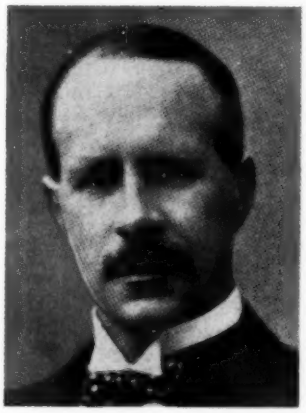


Mr. R. O. Wright

Mr. W. F. Bishop also paid a tribute to Mr. Wright and to the manner in which he had carried out his duties. Sir Montague presented him with an inscribed gold watch, and an Old Sheffield plate candelabra together with a pair of smoked mother-of-pearl opera glasses, were presented to Mrs. Wright. Mr. Wright suitably responded. The arrangements for the presentation were carried out by a committee consisting of Mr. Judge, Miss Joyce Wright, and Messrs. Gower and Stubbs.

Mr. J. G. J. Tattersall, who has held appointments with the Norwich, Luton, Newport (Mon.) and Coventry electricity undertakings, has been appointed control engineer with the North-West Midlands Joint Electricity Authority and will take up his duties at Stafford in November.

Lt.-Col. Lord Dudley G. Gordon, D.S.O., managing director of J. & E. Hall, Ltd., has been elected president of the British Engineers' Association for the ensuing year. Lord Dudley, who is a past-president of the British Association of Refrigeration, became a pupil at the shipyard of Messrs. Hall, Russell & Co., Aberdeen, and afterwards spent a further period as pupil at the works of W. H. Allen, Sons & Co., Ltd., later holding an appointment on the staff of the company. In 1907 he joined J. & E. Hall, Ltd., was appointed a director of the company in 1910, and became one of the managing directors in 1912.



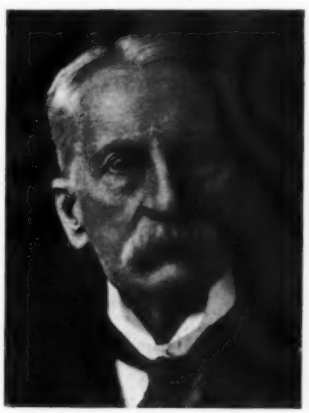
Lt.-Col. Lord Dudley G. Gordon

Mr. N. Hunter, who has been appointed borough electrical engineer of Morley, was presented on October 24th with a "Rolls" de luxe razor by the staff and employés of the Whitehaven Corporation Electricity Department on leaving to take up his new appointment.

Mr. J. H. M. Price, A.M.I.E.E., the author of the article in our last issue entitled "Electricity in the Jungle," is leaving England to-day (Friday) on the *City of Benares*, in order to take up a position with Messrs. Martin & Co. in the United Provinces.

Obituary

Prof. George Forbes.—The death occurred on October 22nd at Worthing of Professor George Forbes, M.A., Hon. LL.D. (St. Andrews), F.R.S., at the age of 87 years. He was born in 1849, a son of Dr. J. D. Forbes, F.R.S., Principal of St. Andrews University, and a grandson of Sir William Forbes, Bt. He was early interested in astronomical science, and at the age of 23 was elected Professor of Natural Philosophy at Anderson's College, Glasgow, where he remained for about nine years. For a short time he acted as a war correspondent in the Russo-Turkish war, but his connection with electrical affairs in which he was destined to figure so prominently for a number of years began in 1881, when he was appointed manager of the old British Electric Light Co., starting the first central station for electric light in London with the Gramme dynamo and using the Lane-Fox incandescent lamp. He started in practice as a consulting engineer in the following year, and advised various electricity authorities, company and municipal, but the most important work with which he was associated was the project for harnessing the forces of the Niagara Falls. The volumes of the Electrical Review for the early 'nineties of the last century contain much interesting matter relating to the controversy which raged around this matter. *The Times* summarises his connection with the scheme in the following sentences:—"He was a leading advocate of the use of alternating current for that enterprise. When in 1890 the International Niagara Commission, constituted under the chairmanship of Lord Kelvin by the Cataract Construction Company, which was to erect the necessary machinery, invited various engineers and engineering firms in Europe and America to submit schemes, Forbes responded with a project according to which electrical power was to be generated, and transmitted both locally and to a distance, by means of polyphase current at a low frequency. Although the Commission was in favour of direct current, it awarded him a premium for his proposal in 1891, and in the following year the Cataract Company appointed him one of its consulting engineers. His engagement was explicitly on the terms that he should examine the plans both for the electrical plant at the Falls and for the electrical distribution to Buffalo, and thus the actual installation owed much to him. In 1893 he designed a vertical



[*Elliott & Fry*

The late Professor George Forbes

alternator, a prominent feature of which was that the armature was stationary while the field magnets revolved outside it, and the first machines set to work at Niagara represented a compromise between his ideas and those of the Westinghouse Company by which they were constructed."

Some years later he reported to the Indian Government on hydro-electric possibilities in the Madras Presidency, visited the Victoria Falls in South Africa to report on their utilisation, and acted as adviser in similar schemes in New Zealand, and in Egypt. He even advised nearly forty years ago that electric locomotives should be run across the Nubian Desert, and investigated the problem of using electric traction for the Nile railways. He was the author of various books on electrical and astronomical subjects, was a member of the Institutions of Civil and Electrical Engineers, and contributed many papers to the proceedings of these and other organisations. His inventions covered a wide range, and included several types of dynamo, an electric meter, carbon brushes, underground conductors, refuse destructors, &c. In his later years Professor Forbes suffered from almost total failure of his eyesight, but our readers will remember his occasional communications to the newspaper Press on electrical subjects.

Mr. H. A. Turner.—We are informed that the death of Mr. H. A. Turner, reported in our last issue, was due to asphyxiation by carbon monoxide fumes, not electric shock, as stated.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Chorlton Lighting Co., Ltd.—Private company. Registered October 20th. Capital, £500. Objects: To acquire the business now carried on by R. Blood and R. A. Kellie at 37, Union Street, Birkenhead, as the Chorlton Lighting Co., and to carry on the business of manufacturers and erectors of, dealers in and agents for all kinds of electrical and mechanical and other advertising devices, illuminated signs, &c. The directors are: R. Blood, 31, Walsingham Road, Wallasey, Ches.; R. A. Kellie, 1258, New Chester Road, Eastham, Ches.; and H. N. Courtney, 62, Woodville Terrace, Liverpool, 6. Registered office: 99, Old Chester Road, Birkenhead.

Vortexion, Ltd.—Private company. Registered October 21st. Capital, £500. Objects: To acquire the registered trade mark "Vortexion," and the goodwill in connection therewith, and to carry on the business of dealers in and agents for the supply and sale of radio, electrical, television, and optical apparatus, &c. The directors are: S. A. Brown, 73, Monkleigh Road, Merton Park, S.W.20; and E. T. Brown, 84, Nelson Road, Wimbledon, S.W.19. Secretary: D. E. Wild. Registered office: 182, The Broadway, Wimbledon, S.W.19.

Sheldon Radio, Ltd.—Private company. Registered October 19th. Capital, £300. Objects: To carry on the business of electricians, electrical and mechanical engineers and contractors, manufacturers of and dealers in electrical, magnetic, galvanic and other apparatus, wireless sets, radiograms, &c. The subscribers are: G. B. Bowater, 50, Carpenter Road, Edgbaston, Birmingham, 15; and C. H. Elgood, 20, Waterloo Street, Birmingham, 2. Registered office: 2069, Coventry Road, Sheldon, Birmingham.

Battery Makers of Ireland, Ltd.—Private company. Registered in Dublin October 16th. Capital, £100. Objects: To carry on the business of makers, repairers of and dealers in electrical and/or chemical appliances and goods of all kinds, engineers, manufacturers and dealers of and in motor cars, and/or flying machines and accessories thereof, &c. The subscribers are: C. E. Coyne, 41-2, Nassau Street, Dublin; and R. A. Warner, 31, Castle Street, Dublin.

Redman-Wheeler Engineering Co., Ltd.—Private company. Registered October 19th. Capital, £1,000. Objects: To carry on business as electrical engineers and general electrical installation contractors, lighting specialists and contractors, &c. The permanent directors are: A. F. Redman, 148, Stockwell Park Road, S.W.9; W. H. A. Wheeler, 31, Brookland Drive, Perivale, Mdx.; and W. E. Holland, 4, Spencer Road, Bromley. A. F. Redman and W. H. A. Wheeler are managing directors.

Premier Radio (Birmingham), Ltd.—Private company. Registered October 19th. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers of and dealers in radio and television apparatus and equipment, &c. The permanent directors are: W. Pilkington, Thornlea, Birmingham Road, Wylde Green; and D. S. Griffiths (managing director), The Chessetts, Yardley Wood Road, Birmingham. Solicitors: Thomas, Guest & Pearson, 29, Temple Row, Birmingham.

Tibhall Manufacturing Co., Ltd.—Private company. Registered October 21st. Capital, £500. Objects: To carry on the business of general and electrical engineers, manufacturers of wireless and electrical instruments and accessories, winding machines of all kinds, bakelite and all other bobbins, &c. The directors are: H. H. E. Hall, 47, Manor Park Road, N.W.10; and D. C. Tibbles, 28, Kinloch Drive, N.W.9. Registered office: British Sampson Works, Acton Lane, N.W.10.

F. J. Learmouth, Ltd.—Private company. Registered October 19th. Capital, £1,000. Objects: To carry on the business of electricians, electrical and mechanical engineers and contractors, manufacturers and workers of and dealers in electrical appliances, &c. The directors are: F. J. Learmouth, 786a, Finchley Road, N.W.11; and L. F. Tavender, 16, Copthall Drive, Mill Hill, N.W.7. Registered office: 786a, Finchley Road, N.W.11.

Scott's Radio Houses, Ltd.—Private company. Registered October 23rd. Capital, £1,000. Objects: To carry on the business of wholesale and retail dealers in wireless apparatus, electrical appliances, &c. The subscribers are: J. Harris, 20, Barking Road, West Ham, E.6, and F. Harris, 15, Whiteborn Lane, Dagenham. J. Harris is first director. Solicitor: M. Lesser, Yorkshire House, 43, The Broadway, E.15.

Eastonia, Ltd.—Private company. Registered October 19th. Capital, £100. Objects: To carry on the business of wireless and electrical engineers and dealers, &c. The directors are: G. W. Fairall, 28, Gibbons Road, Newbridge, Wolverhampton; and E. C. Garratt, 34, West Hill Avenue, Hednesford, Staffs. Registered office: 12, Church Street, Wolverhampton.

T. D. Long & Co., Ltd.—Private company. Registered October 3rd. Capital, £100. Objects: To carry on the business of electricians, plumbers, heating, electrical and mechanical engineers, builders, manufacturers of and dealers in machinery, electrical, magnetic, galvanic, radio, heating and sanitary apparatus, &c. The directors are: T. D. Long, 4, Leaventhorpe Grove, Thornton, Bradford; and R. L. Cheetham, 24, Cranbourne Road, Bradford. Registered office: 4, Leaventhorpe Grove, Thornton, Bradford.

Modern Electrical Co. (Willesden), Ltd.—Private company. Registered October 3rd. Capital, £250. Objects: To acquire the business of an electrical engineer and contractor carried on by C. L. Hodgskin, of 6, Station Parade, Willesden Green, as "Modern Electrical." The directors are: C. L. Hodgskin and Mrs. Violet I. Hodgskin, both of 24, St. Paul's Avenue, Cricklewood, N.W.2. Registered office: 6, Station Parade, Willesden Green, N.W.2.

Coil Equipment Co., Ltd.—Private company. Registered October 17th. Capital. £300. Objects: To acquire the business of coil winders to the radio and electrical trades carried on by A. Wheeler and F. G. Cooke at 317, High Road, Lee, S.E.12. The directors are: A. Wheeler, 317, High Road, Lee, S.E.12; and F. G. Cooke, 66a, Manor Lane, Lee, S.E.12. Secretary: L. G. Wheeler. Registered office: 317, High Road, Lee.

F. J. Jones (Electrical Engineers), Ltd.—Private company. Registered October 5th. Capital, £500. Objects: To carry on business as electrical and refrigeration engineers and general electrical installation contractors, &c. The subscribers are: W. A. Wallace, 56, Hamilton Square, Birkenhead; and T. Siddall, 13, John Dalton Street, Salford. Solicitors: Tatham, Worthington & Co., 1, St. James's Square, Manchester.

Walls Radio, Ltd.—Private company. Registered October 8th. Capital, £1,600 in 1,600 shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in gramophones and sound reproducing and television machines, electric accumulators and batteries, wireless aerials, &c. The directors are: W. D. Davis, 224, Old Christchurch Road, Bournemouth, and M. J. E. Murray, Buclaw, South Queensferry.

Radio Conversions, Ltd.—Private company. Registered October 8th. Capital, £100. Objects: To carry on the business of electricians, radio and electrical engineers, experts and contractors, &c. The directors are: E. E. Newbury and B. Newbury, both of 8, The Avenue, Hornsey, N.8. Secretary: E. E. Newbury. Registered office: 46, Mayes Road, Wood Green.

L. W. Davis, Ltd.—Private company. Registered October 21st. Capital, £500. Objects: To carry on business as electrical engineers, erectors and operators of wireless transmitting and receiving stations, &c. The permanent directors are: L. W. Davis, 6, Sunnymede Avenue, Carshalton Beeches, Surrey; and Mrs. D. M. Tucker, "Vectis," Sunnymede Avenue, Carshalton.

Mecalectric, Ltd.—Private company. Registered October 9th in Dublin. Capital, £100. Objects: To carry on the business of electrical engineers and repairers of electrical motors and electrical goods, &c. The directors are: M. C. Behal, 40, Sandycove Road, Sandycove, Co. Dublin; and R. L. Brady, Les Liesres, Maretimo Gardens East, Blackrock, Co. Dublin.

Returns of Electrical Companies

Para Electric Railways and Lighting Co., Ltd.—Particulars filed of £100,000 5½ per cent. prior lien debenture stock, authorised July 13th, 1936, and covered by trust deed dated September 30th, 1936, constituting a first specific charge on freehold property, buildings, plant and machinery in Brazil, and a floating charge on the company's undertaking and other property, and assets, including uncalled capital, the amount of the present issue being £75,000, and ranking in priority to the charge subsisting in favour of trustees of deeds securing first debenture stock. Trustees: Consolidated Trust, Ltd., 69, Old Broad Street, E.C.2.

Western Electrical Power Co. (Liverpool), Ltd.—The nominal capital has been increased by the addition of £4,400 beyond the registered capital of £600. The additional capital is divided into 400 ordinary, 1,000 "A" 7½ per cent. cumulative preference, 1,000 "B" 7 per cent. cumulative preference and 2,000 "C" 6 per cent. cumulative preference shares, all of £1 each.

Parmiter Hope & Sugden, Ltd.—Debenture dated October 7th, 1936, to secure £10,000 charged on the company's undertaking and property, present and future, including uncalled and unpaid capital (subject to first mortgage debenture dated November 30th, 1934). Holders: District Bank Nominees, Ltd.

Heath Electrical and Gramophone Co., Ltd.—L. J. Goss, of 39, Constantine Road, Hampstead, N.W.3, ceased to act as receiver and manager on September 18th, 1936.

Marconi's Wireless Telegraph Co., Ltd.—Capital, £4,000,000 in 3,250,038 ordinary shares of 10s., 499,935 ordinary shares of £1, 3,250,092 shares of 10s., and 250,000 7 per cent. cumulative participating preference shares of £1. Return dated June 4th, 1936. 3,250,038 ordinary shares of 10s., 395,114 £1 ordinary, and 250,000 preference shares taken up. £1,797,484 10s. paid on 3,094,959 10s. ordinary and 250,000 preference shares, £472,648 10s. considered as paid on 155,059 10s. ordinary and 395,114 £1 ordinary. Mortgages and charges nil.

L. W. Douthwaite & Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated October 1st, 1936, to secure all moneys due or to become due from the company to the Union Bank of Manchester, Ltd.

Cawnpore Electric Supply Corpn., Ltd.—Capital, £547,986 in 200,000 preference and 347,986 ordinary shares of £1. Return dated June 8th, 1936. 200,000 preference and 200,000 ord. shares taken up. £325,000 paid on 200,000 preference and 125,000 ordinary shares. £75,000 considered as paid on 75,000 ordinary shares. Mortgages and charges, £132,080.

Isle of Arran Electric Light & Power Co., Ltd.—Capital, £20,000 in 19,000 ordinary and 1,000 preference shares of £1. Return dated July 12th, 1936. 14,700 ordinary and 1,000 preference shares taken up. £14,500 paid on 14,500 ordinary shares, £1,200 considered as paid on 200 ordinary and 1,000 preference. Mortgages and charges nil.

Anglo-American Telegraph Co., Ltd.—Capital, £7,000,000 in £229,140 ordinary stock, £3,385,430 preferred ordinary stock, and £3,385,430 deferred ordinary stock. Return dated June 4th, 1936. All stock issued. £600,000 paid, £6,400,000 considered as paid. Mortgages and charges nil.

Birmingham Insulators, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated September 25th, 1936, to secure £500. Holder: A. W. Martin, 31, Westfield Road, Edgbaston, Birmingham.

Watsham's, Ltd.—Capital, £25,000 in £1 shares. Return dated July 23rd, 1936. 9,682 shares taken up. £2,911 paid, £6,771 considered as paid. Mortgages and charges nil. A further 5,808 shares were allotted as fully paid by way of "bonus" on September 8th, 1936.

Siemens & General Electric Railway Signal Co., Ltd.—Capital, £20,000 in 10,000 "A" ordinary and 10,000 "B" ordinary shares of £1. Return dated June 29th, 1936. 3,500 "A" and 3,500 "B" shares taken up. £7,000 paid. Mortgages and charges nil.

Sudan Light & Power Co., Ltd.—Capital, £450,000 in 94,000 cumulative preference and 356,000 ordinary shares of £1. Return dated July 9th, 1936. 52,000 preference and 356,000 ordinary shares taken up. £408,000 paid. Mortgages and charges: £400,000.

Berry's Electric (1928), Ltd.—Capital, £225,000 in 10s. shares. Return dated July 14th, 1936. 282,007 shares taken up. £1,003 10s. paid on 2,007 shares, £140,000 considered as paid on 280,000 shares. Mortgages and charges: £57,300.

Watson, Marsh & Co. (Brondesbury), Ltd.—Mortgage on properties in Brondesbury, N.W., dated September 30th, 1936, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Johnson & Co. (Bradford), Ltd.—Capital, £1,000 in 500 preference and 500 ordinary shares of £1. Return dated August 31st, 1936. 500 ordinary shares taken up. £500 paid. Mortgages and charges, nil.

Delhi Electric Supply & Traction Co., Ltd.—Capital, £200,000 in £1 shares. Return dated June 9th, 1936. All shares taken up. £121,000 paid £79,000 considered as paid. Mortgages and charges, nil.

British Automatic Refrigerators, Ltd.—W. E. Ogden, C.A., of Audrey House, Ely Place, E.C.1, was appointed receiver on October 12th, 1936, under powers contained in debenture dated October 7th, 1935.

City Notes

The Perak River Hydro-Electric Power Co., Ltd.—Presiding at the annual meeting held on October 22nd Mr. G. Balfour (chairman) recalled that last year he spoke of the possibility of dealing with the repayment of the 4 per cent. prior lien debenture stock before the earliest date for repayment. Now it had been decided to deal with the provision of funds for this repayment when an issue was made for other capital requirements, which would include extensions to the steam generating stations and mains distribution. The maximum load recorded for the year under review was 36,800 kW, against 23,200 kW for the previous year, while 176,287,000 kWh was sold, compared with 111,864,000 kWh. These results reflected the effect of a twelve months' average Malayan tin quota of 60.45 per cent., in comparison with 32.8 per cent. for the preceding year. This year a moderate portion of the £40,000 allocated to reserve would be applied to establish a fund, in the nature of a pension scheme, for their staff in Malaya. Output and revenue for the first two months of the current year were satisfactory and showed an increase on the corresponding period last year. During a considerable part of last year they had to resort to steam plant to meet the ordinary daily demand, and in the absence of any great depression they would require to operate this plant daily. Therefore any rise in output and in receipts from sales would show a smaller percentage of profit than the output to date. Charges, however, had been and would be fixed to provide for the revenue under conditions of mixed steam and hydro-electric generation, and if they continued on more or less the same average tin output the revenue during the current year would be increased. Relations with the Government and the consumers were excellent, and now that the business was firmly established they hoped to consolidate the smaller electricity supply undertakings in the Perak State with advantage all round.

Warner's Radio & Electric, Ltd., in its first report for the year to September 30th shows a balance on trading account of £63,172. After providing for unmatured interest, bad debts, directors' fees, &c., there is a profit of £37,177. A transfer of £3,500 is made to tax account, and £6,989 is transferred to capital reserve in respect of profit earned prior to incorporation. The final dividend is 15 per cent. actual. The interim was at the rate of 30 per cent. per annum for the period December 18th, 1935, to March 31st, 1936.

Broadcast Relay Service has announced an interim dividend of 5 per cent. on the ordinary stock. This year's dividend is equal to the 15 per cent. interim paid a year ago as a 200 per cent. capital bonus was distributed in January last.

The Lincolnshire and Central Electric Supply Co. held an extraordinary meeting on October 22nd at which a resolution was passed for increasing the capital to £750,000 by the creation of 250,000 ordinary shares of £1 each.

Ever Ready Co. (Great Britain), Ltd., has declared an interim dividend of 15 per cent. actual on the ordinary stock (against 10 per cent. last year).

The Madras Electric Supply Corporation, Ltd., is paying interim ordinary dividend of 2½ per cent., free of tax (same).

The Midland Electric Corporation for Power Distribution is placing privately £300,000 3¼ per cent. first mortgage debenture stock, 1955-73. The present placing will bring the amount of this stock to £600,000.

Ward & Goldstone, Ltd., have declared an interim dividend on the ordinary shares for the half-year ended September 30th at the rate of 10 per cent. per annum, less tax.

Radio Central Exchanges, Ltd.—Presiding at the annual meeting on October 26th, Mr. A. B. Winch (chairman) outlined the company's position as a result of the policy announced by the Government in relation to relay exchanges. He said that the current licences would be extended for a period of three years from December 31st, 1936, but the disturbing feature was that the Postmaster-General pointed out that relay exchanges had no guarantee of continuance beyond December, 1939. Despite the Government ban on extensions to new areas, they had to record a net increase of 7 per cent. in the number of subscribers in existing areas. As to the immediate future, with security at least until December, 1939, it would now be their policy to connect as many subscribers in existing areas as their services could accommodate without incurring any considerable increase on capital account. If relay systems were to be nationalised they would strive, in co-operation with their fellow operators, for the equitable treatment of their shareholders.

J. & F. Stone Lighting & Radio, Ltd.—The lists opened on Tuesday last for an offer for sale of 115,000 6 per cent. cumulative redeemable preference shares of £1 each at 21s. per share and 740,000 ordinary shares of 5s. each (2s. 6d. paid) at 6s. 9d. per share (equivalent to 9s. 3d. per share when fully paid). The remaining 2s. 6d. per share will be called up by the company on or before October 19th, 1937, on thirty days' notice. With the shares now offered the issued capital in the respective classes will then be £200,000 and £400,000. The additional capital will be used to open more branches and to enter more actively into hire-purchase business.

Erinoid, Ltd.—Presiding at the annual meeting on October 21st Mr. A. Binnie (chairman), in the course of his address, said that the company had now come of age and was never in a more satisfactory position. Their financial resources were ample, and they had established world-wide trade connections. The Erinofort department was now earning a good profit and continued to progress. They had reason to be optimistic as to the future, provided no further restrictions were imposed on the export trade.

Stocks and Shares

TUESDAY EVENING.

FOREIGN politics have once more obtruded their unwanted spoke into the wheels of the Stock Exchange markets. There was already, and prior to the latest foreign disturbances, a slight disposition, in various speculative parts of the House, towards reaction. Speculation has been extremely busy of late, with the result that, in certain popular stocks and shares, a fairly large bull account has been built up. Part of this was for account of operators who, for one reason or another, intend to get in and out of shares within the fortnightly period of a Stock Exchange Settlement.

The investment markets, on the other hand, are more affected by the political developments abroad than they are by speculative transactions at home, and with several parts of the Continent seething with unsettlement, it is not very surprising to find that money is a little cautious about entering into fresh commitments at this time of uncertainty. There is, nevertheless, a considerable volume of business being done, and so far from general confidence being perturbed, the fact remains that investment in the best class of industrial shares goes on with little pause. The quota of copper production has been raised 10 per cent. to 95 per cent. The price of raw rubber is once more a shade over 8d. per lb.

British Insulated

The proposed distribution to Henley's Telegraph ordinary shareholders of a free share-for-share bonus has focused attention on other shares in the same field, and, in particular, on those which offer the prospect of a return in similarly attractive form. The market's eye has been caught, in its search for the next capital bonus, by British Insulated shares, which appear to head the list of possibilities. In the last British Insulated balance-sheet, reserves stood at £1,500,000, against an issued ordinary capital of £1,660,000, giving a ratio only a little less impressive than the corresponding Henley's figures. The latter showed reserves actually in excess of issued capital. British Insulated gave, for 1935, a cash bonus of 5 per cent. on top of the usual annual distribution of 15 per

cent. A scrip bonus, this year or next, would come as no surprise to the market. The price of the ordinary shares has risen 7s. 6d. to £6.

Electrical Equipment Shares

A bout of profit-taking in Henley's, after the big rise of the last three weeks, left the price ¼ lower at 8½; British Insulated, as mentioned above, came strongly into the picture, Siemens again advanced, rising to 33s. 9d. Callenders and Enfields remained quiescent, but London Electric Wire went further ahead to 37s. 6d. General Cables reacted 6d. to 7s. 6d., and Johnson and Phillips 9d. to 51s. 3d.

In other directions, Associated Electricals show a florin gain, and Brush, now 43½, has a much better appearance. The reverse trend is evident in General Electrics and English Electrics, which have lost 1s. apiece. Chloride Electrical Storage recovered to £5, encouraged by the Ever Ready announcement. Reyrolles, at £4, show a rise of 5s. 9d. on the past fortnight. Ismay Industries are up to 9s. Other firm features are Switchgear and Cowans and Strand Electric Holdings, which are in demand at 18s. and 8s. 9d. respectively. The telephone group is on the dull side, with recessions in Telephone Manufacturing, 10s. 9d., Halls, 24s. 9d., and Ericssons 58s. 9d.

Edmundsons "Repatriated" Shares

Last July's negotiations for the repatriation, from America, of the Edmundsons Electricity Corporation control resulted, this week, in the marketing of a block of 800,000 out of the 2,700,000 ordinary shares which changed hands at that time. The price opened in the market at 46s., and public demand took up practically the whole block at around that price. The public now holds some 1,800,000 of "repatriated" ordinary shares, the balance being largely in the hands of the Prudential Assurance and the Imperial Continental Gas Companies, both of which participated, with Lazard Bros., in the repatriation deal. The market looks for an ordinary dividend of 9 per cent. this year, as against last year's 8 per cent.

Ever-Ready Dividend

Taking the market by surprise, the announcement of a 5 per cent. increase in the Ever-Ready interim dividend produced a rise of 2s. 9d., to 30s., in the price of the company's 5s. units of stock. Dividends totalling 35 per cent. have been paid regularly on the latter for many years; the latest news opens up the prospect of a variation of the rate in the right direction.

The company's business is said to be showing further expansion. Inroads have doubtless been made by all-mains radio sets into the battery-manufacturers' field, where close competition had already made trading conditions difficult. There is, however, a good prospect of agreement between the leading manufacturers to lessen the latter difficulty. The Lissen interest has been another subduing market-factor, but there also the outlook is growing brighter. Furthermore, recent currency events may lead to an improvement in the position overseas.

Taking everything into consideration, and granting the possibility of, say, a 40 per cent. ordinary dividend for the full twelvemonth, this week's rise in the price of the shares cannot be said to lack justification.

Miscellaneous Matters

The gilt-edged market is in rather undecided mood. Government stocks, after minor fluctuations, are little changed on the week. Central Electricity Board issues, on the other hand, have been in good demand; gains of a point are registered in the 5 per cent. stock, 1950-1970, and in the 4½ per cent. stock, 1951-1973. London and Home Counties 4½ per cents., 1955-1975, are also a point to the good, at 115.

The electricity supply share-list shows a few sixpenny declines and a shilling loss in Scottish Power. In the Overseas group, interest flagged in Perak Hydros, but was taken up in Nigerian Corporations, the respective prices now being 31s. 3d. and 26s. Palestine Electric "A" reacted to 53s. 6d., as did Calcuttas to 57s. ex-dividend. Cable and Wireless issues remain heavy. Marconi Marines shed 1/8 to 1⅛. Great Northern Telegraphs, which have been depressed by fears of unfavourable currency reactions, rallied from 42½ to 46. Amongst dollar stocks, Western Unions are better at 92.

Nigerian Electricity

The Perak Hydro-Electric company's profitable participation in the reviving fortunes of Malayan tin-producing concerns has recently stimulated demand for the company's ordinary shares, and also has drawn attention to the claims of Nigerian Electricity Supply Corporation issues, the latter company having a Nigerian Government lease to supply electricity to the State's tin mines. The lease expires in 1972, and carries the right to a further 20 years' extension.

The bulk of the Nigerian company's £500,000 capital consists of £1 preferred ordinary shares, which are entitled to a non-cumulative dividend of 7½ per cent. per annum, and, after provision has been made for a reserve fund, to half the remaining profits. For last year shareholders received only 4½ per cent., but at the annual meeting in July it was anticipated that a continuance of the conditions then obtaining would enable the company to earn profits sufficient to allow payment this year of a full 7½ per cent. dividend on the preferred ordinary shares and the placing of a substantial sum to reserve. If the shares were to receive the full 7½ per cent. to which they are entitled when it is earned, the yield at the present price of 26s. would be £5 14s. per cent.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Last.	Price. Oct. 27.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/6	—	4 0 0
Clyde Valley	1	7	8	47/6	—	3 7 7
County of London	1	10½	10½	55/-	−6d.	3 16 4
Edmundson's 7% Pref.	1	7	7	36/-	+6d.	3 17 9
Do. Ord.	1	8	8	46/-	+6d.	3 9 7
Elec. Dis. Yorkshire	1	9	9	49/-	—	3 15 0
Elec. Fin. and Securities	1	12½	12½	3½	—	4 0 0
Elec. Supply Corporation ...	1	11	11	59/6	—	3 13 10
Lancs Light and Power	1	7½	7½	38/6	—	3 18 0
Lond. Assoc. Electric	1	—	7	35/-	—	4 0 0
London Electric	1	7	8	39/6	—	4 1 1
London Power Deb. Red. ...	Stock	5	5	107½	—	4 13 0
Metropolitan	1	10	10	51/-	−6d.	3 18 8
Midland Counties	1	7	7½	41/-	−6d.	3 13 2
Mid. Elec. Power	1	8	8	45/-	—	3 11 1
North Eastern Electric Ordinary	1	6	6	34/6	−6d.	3 9 7
Do. 7% Pref.	1	7	7	36/6	—	3 16 9
Northampton	1	10	10	51/3	—	3 18 2
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 3
North Met. Elec. Ordinary ...	1	10	10	57/6	—	3 9 7
Do. do. 6% Pref. ...	1	6	6	32/-	—	3 15 0
Scottish Power	1	8	8	41/-	−1/-	3 18 2
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/6	—	6 7 8
Yorkshire Elec.	1	8	8	44/-	—	3 12 9

PUBLIC BOARDS.

Central Electricity, 1950–70 ...	Stock	5	5	118½	+1	4 4 5
Do. 1955–75 ...	„	5	5	120	+½	4 3 4
Do. 1951–73 ...	„	4½	4½	114	+1	3 19 0
Do. 1963–93 ...	„	—	3½	105	+½	3 6 8
London Elec. Trans. Gtd. ...	„	—	2½	96	—	2 12 1
London & Home Counties, 1955–75	„	4½	4½	115	+1	3 18 3
London Passenger Transport, A...	„	—	4½	126½	—	3 11 2
Do. do. B...	„	—	5	129	−½	3 17 3
Do. do. C...	„	3½	4	102	—	3 18 5
West Midlands Joint Elec. 1948–68	„	—	5	115½	—	4 6 7

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	182½	—	4 18 8
Anglo-Am. Tel. Pref.	Stock	6	6	128½xd	+1	4 13 5
Do. Def.	„	1½	1½	31	—	4 16 9
Cable & Wireless 5½% Pref. ...	„	4½	5½	103½	—	5 6 3
Do. A. 7½% Ord.	„	Nil	Nil	20½	—	—
Do. B. Ord.	„	Nil	Nil	6½	−½	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	14	—	3 4 4
Do. Do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	46	+3½	4 17 0
Marconi-Marine	1	10	7½	36/3	−1/-	4 2 9
Oriental Telephone Ord.	1	12*	12*	3 3/16	—	3 15 6

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	9/6	+1/16	—
Do. do. 2nd Pref.	5	Nil	Nil	5/-	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	24½	+4	—
British Electric Traction Df. Ord.	„	5	5	1650	—	—
Do. do. Pref. Ord.	„	8	8	180½	—	4 8 8
Brazil Traction	100	—	30 cts.	16¾	+¼	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	104½	—	4 15 8
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 1st Bonds	$500	5	5	50	—	—
Victoria Falls Ord.	1	20	12	75/9	−1/9	3 3 4
West Riding	1	5	6½	50/-	—	2 12 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	62/6	—	4 16 1
Assoc. Elec. Ord.	1	6	8	55/-	+2/-	2 18 2
Do. Pref.	1	8	8	39/6	—	4 1 0
Babcock & Wilcox	1	8	8	51/6	—	3 3 4
British Aluminium Ord.	1	7½	7½	43/-	+2/6	3 9 9
British Insulated Ord.	1	15	20	6	+7/6	3 6 8
Brush Ord....	Stock	Nil	Nil	43½	+5	—
Callender's	1	15	15	4 5/16	—	3 5 8
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord. ...	5/-	—	12½	4½	—	—
Do. 8% Pref.	1	8	8	2	—	4 0 0
Electric Construction	1	3½	7	40/-	—	3 10 0
Enfield Cable Ord.	1	25	25	5 1/16	—	4 7 0
English Electric	1	Nil	Nil	25/6	−1/-	—
Do. Do. Pref.	1	Nil	Nil	28/-	—	—
Ericsson Tel.	5/-	24	20*	58/9	−1/8	1 14 0
Ever Ready	5/-	35	35	30/-	+2/9	5 16 8
Ferranti Pref.	1	7	7	28/9	—	4 17 5
G.E.C. Pref.	1	6½	6½	35/-	—	3 14 4
Do. Ord	1	10	15	91/-	−1/-	3 5 10
Henleys	1	30	30	8½	−½	3 10 7
Do. 4½% Pref.	5	4	4½	5½	—	3 18 3
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	7½	10	51/3	−9d.	3 18 0
Lancashire Dynamo	1	5	10	3	—	3 6 8
Siemens Ord.	1	4	6	33/9	+½	3 11 0
Telegraph Construction	£1	Nil	Nil	33/9	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be numbered and abridged and all subsequent proceedings will be taken.

1934

37078. "Lead-in arrangements for electric conductors. Porzellanfabrik Kahla. December 27th, 1933. (454318.)

37125. "Electric supply systems on railway and like vehicles." F. Karim. January 23rd, 1934. (454370.)

1935

432. "Electrical musical instruments." L. Hammond. January 19th, 1934. (454502.)

2348. "Television receiver." Radioakt.-Ges. D. S. Loewe. January 25th, 1934. (454319.)

2386. "Telegraph, signalling and like selective systems and apparatus." V. Sims. January 29th, 1935. (Cognate applications 7277/35, 11111/35, 14317/35 and 24388/35.) (454553.)

3372. "Television transmitting apparatus embodying cathode-ray tubes." W. S. Brown. February 1st, 1935. (454486.)

6396. "Photo-electrically sensitive means for use in cathode-ray tubes and like devices." Marconi's Wireless Telegraph Co., Ltd., February 28th, 1934. (454422.)

9269. "Invertors for producing high-frequency and alternating current." British Thomson-Houston Co,. Ltd. March 23rd, 1934. (454489.)

9286. "Alternating-current motors." A. S. Cachemaille (Warren Telechron Co.). March 27th. 1935. (454491.)

9599. "Control of electric lifts." E. N. Hammond and E. Pollard & Co., Ltd. March 27th, 1934. (454492.)

9792. "E'ectric fuses." A. Reyrolle & Co., Ltd., and C. S. Lawson. March 29th, 1935. (454381.)

9813. "Television and like systems." T. M. C. Lance and Baird Televi'sion, Ltd. March 29th, 1935. (454383.)

9889. "E'ectrical filters." Marconi's Wireless Telegraph Co., Ltd., and N. M. Rust. March 29th, 1935. (454503.)

9904. "Switching arrangement in coin boxes for telephone systems." Telefonaktiebolaget L. M. Ericsson. March 29th, 1934. (454395.)

9987. "Thermionic-valve amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 12th, 1934. (454435.)

10097. "Radio connection in combination with telephone circuits." D. Mastini. April 1st, 1935. (454564.)

10110. "Electron-discharge device amplifiers." Marconi's Wireless Telegraph Co., Ltd. (A. W. Vance.) April 1st, 1935. (Convention date not granted.) (454511.)

10125. "Control of electric light circuits." J. F. Appleford. April 1st, 1935. (454625.)

10204. "Filling and vent plugs and liquid-level indicators for electric-storage batteries." J. Lucas, Ltd., and G. D. Spencer. April 2nd, 1935. (Cognate application 16731/35.) (454568.)

10225. "Visual indicators for echo-sounding apparatus." H. Hughes and Son, Ltd., and D. O. Sproule. April 2nd, 1935. (454569.)

10241. "Indicating devices particularly for use with impulse transmitters as used in automatic telephone systems." Associated Electric Laboratories, Inc. April 11th, 1934. (454571.)

10252. "Electrical resonators and electrical wave filters for use in high-frequency signalling and like systems." Marconi's Wireless Telegraph Co., Ltd. April 2nd, 1934. (454572.)

10258. "Electric furnaces." G. H. S. Grene and Wild-Barfield Electric Furnaces, Ltd. April 2nd, 1935. (454574.)

10473. "Electrodes for electric furnaces." Det Norske Aktieselskab for Elektrokemisk Industri. April 6th, 1934. (454584.)

10492. "Adjustable inductances." General Electric Co., Ltd., and A. E. Pearson. April 4th, 1935. (454587.)

10514. "Television and like systems." J. L. Baird and Baird Television, Ltd. April 4th, 1935. (454588.)

10515. "Method of transmission and/or reproduction in television, telekinematographic and like systems and apparatus therefor. J. L. Baird and Baird Television, Ltd. April 4th, 1935. (454589.)

10580. "Telegraph transmitters." Creed & Co., Ltd., and R. D. Salmon. April 5th, 1935. (454593.)

10619. "Piezo-electric devices and methods of making the same." A. H. Stevens (Brush Development Co.). April 5th, 1935. (454595.)

10652. "Television and like systems." J. C. Wilson and Baird Television, Ltd. April 5th, 1935. (454601.)

10653. "Methods of and means for scanning in television." J. C. Wilson and Baird Television, Ltd. April 5th, 1935. (454602.)

10710. "Containers or holders, supports and couplings for incandescent electric lamps, primarily intended for decorative purposes." A. Moodie, H. N. B. Williams, J. R. Fowler, Devereux, Moodie & Co., Ltd., and H. Walker & Son, Ltd. April 6th, 1935. (454604.)

10964. "Means for feeding several electric amplifiers from the same supply." General Electric Co., Ltd., D. C. Espley and D. O. Walter. April 9th, 1935. (454633.)

11164. "Lifts." J. & E. Hall, Ltd., and A. A. Read. April 10th, 1935. (454605.)

11648. "Electrical insulators having high surface leakage resistance and process of making the same." Corning Glass Works. May 2nd, 1934. (454448.)

11700. "Electric cables." Callender's Cable & Construction Co., Ltd., P. V. Hunter, H. Hill and L. G. Brazier. April 16th, 1935. (Cognate application 34545/35.) (454449.)

12960. "Systems of control for electrically operated lifts." General Electric Co., Ltd., and A. A. Chubb. May 1st, 1935. (454451.)

14956. "Water heaters, more particularly electric water heaters." H. H. Berry. May 22nd, 1935. (454520.)

15700. "Fuse boxes adapted to be connected to service cables through sealing boxes." V. Hope. May 30th. 1935. (454329.)

16777. "Electrical transmission particularly for traction machines." J. Sousedik. November 24th, 1934. (454395.)

16877. "Electric time alarm systems." S. Citterio and P. Vacchina. June 9th, 1934. (454609.)

22163. "Means of illumination comprising a plurality of discharge devices." General Electric Co., Ltd., and J. W. Ryde. August 6th, 1935. (454459.)

23273. "Means of deflecting electron rays in electric discharge tubes." British Thomson-Houston Co., Ltd. August 22nd. 1934. (454460.)

23490. "Insulating and protective covering for electric cables." British Thomson-Houston Co., Ltd. September 8th, 1934. (454461.)

25644. "Motor arrangement for electrically driven vehicles." W. J. Tennant (Tatra Works, Ltd.). September 16th, 1935. (454464.)

26030. "Automatic electrical regulator circuit arrangements." Siemens & Halske Akt.-Ges. September 19th, 1934. (454465.)

32284. "Relaxation oscillation circuit for interlaced scanning in television. Radioakt.-Ges. D. S. Loewe. November 23rd, 1934. (454471.)

32618. "Detector circuit for radio receiving apparatus." Magyar Wolframlampa Gyar Kremenezky Janos Reszvenytarsasag. November 23rd, 1934. (454618.)

35253. "Receivers of electrical oscillations." General Electric Co., Ltd., N. R. Bligh, L. C. Stenning and J. Stewart. February 26th, 1935. (454341.)

35371. "Mercury switches." British Thomson-Houston Co., Ltd. December 28th, 1934. (454342.)

1936

136. "Permanent magnets." Marrison & Catherall, Ltd., and A. C. Catherall. January 2nd, 1936. (Addition to 442127.) (454406.)

1081. "Receiving apparatus for carrier-wave signalling systems." C. Lorenz Akt.-Ges. January 15th, 1935. (454346.)

2289. "Device comprising an electric mercury-vapour discharge tube and a red fluorescent layer. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 20th, 1935. (454348.)

2297. "Receiving device for radio direction-finding systems." C. Lorenz Akt.-Ges. January 24th, 1935. (Addition to 424275.) (454476.)

2298. "Microphones." C. Lorenz Akt.-Ges. January 26th, 1935. (454531.)

3549. "Electric starter for internal combustion engines." V. Bruza. February 5th, 1936. (454534.)

3997. "Lighting devices." G. W. Winkler. February 11th, 1935. (Cognate application 3998/36). (454351.)

4360. "Maximum-load automatic tumbler switches." E. Reich. February 13th, 1936. (454535.)

6849. "Electric transformers." British Thomson-Houston Co., Ltd. March 8th, 1935. (454538.)

6959. "Moveable current collectors for variable electrical resistances." Siemens & Halske Akt.-Ges. March 9th, 1935. (454356.)

7219. "Television system." C. Lorenz Akt.-Ges. March 14th. 1935. (454539.)

7259. "Circuit arrangements for the control of multiple phase gas or vapour electric-discharge gaps." Siemens Schuckertwerke Akt.-Ges. April 3rd, 1935. (454541.)

7338. "Electric condensers." G. W. Johnson (Allmanna Svenska Elektriska Aktiebolaget). March 11th, 1936. (Convention date not granted.) (454542.)

8807. "Lead-in constructions for thermionic valves, and like electrical apparatus." Marconi's Wireless Telegraph Co., Ltd. April 2nd, 1935. (454544.)

9404. "Current supply contacts for the electrodes of electric furnaces." Siemens-Planiawerke Akt.-Ges. für Kohlefabrikate. March 28th, 1935. (454359.)

9885. "Method of and system for determining positions by means of a rotating beacon." C. Lorenz Akt.-Ges. April 3rd, 1935. (Addition to 447707.) (454360.)

11333. "Thermionic valve arrangements." J. Pintsch Akt.-Ges. April 18th, 1935. (454361.)

11696. "Manufacturing of electric resistances." Elektrische Gluhlampenfabrieken J. Kremenezky Akt.-Ges. April 26th, 1935. (454364.)

12317. "Electrical contact plugs and wiring installations." Cinch Manufacturing Corporation. May 10th, 1935. (454547.)

12966. "Electrode system for rectifying or controlling high- or intermediate-frequency oscillations. Naamlooze Venrootschap Philips' Gloeilampenfabrieken. July 30th, 1935. (454548.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 21st:—

Televisor. No. 570727. Class 8. Telegraphic, telephonic and television apparatus.—Baird Television, Ltd., 58, Victoria Street, Westminster, S.W.1.

Invicta. No. 571143. Class 13. Electric waving irons.—R. Hovenden and Sons, Ltd., 29-33, Berners Street, W.1.

The Heating of Lubricating Oils

It is generally held that it is undesirable to heat lubricating oils above, say, 180 deg. F. previous to reconditioning them by centrifuge or by filter. This inhibition prevails despite the fact that during manufacture and in use, these oils are subjected to much higher temperatures. It would be of great advantage to designers and manufacturers of reconditioning apparatus and to the users of such devices were it possible to remove this virtual restriction. Mr. Wilfred E. Gooday, Brettenham House, Wellington Street, W.C.2, asks if there is any evidence to show that preheating (for reconditioning) has damaged or has contributed to the deterioration of a lubricating oil. He says that if we are dealing with a bogy the sooner we chase it away the better. If there is some substantial data to work on reason might be substituted for prejudice.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Houses (183), Padarn Crescent, Llanbadarn, for Mrs. E. Jones, Brynystwyth, Penparcau.

Addiscombe.—Extensions to factory, Tunstall Road; Arens Controls, Ltd.

Amble.—Houses (86); W. Burton, U.D.C. surveyor.

Annfield Plain.—Houses (50), in connection with Humber View and Tower Road clearance schemes; U.D.C. surveyor.

Aylesbury (BUCKINGHAMSHIRE).—Houses (38), Walton Way, for H. C. Janes, Ltd., Luton.

Barnsley.—Houses (55), Warner Avenue, for Real Estates (Doncaster), Ltd.

Basingstoke.—Extensions to premises for the Co-operative Society, Ltd., New Street.

Bath.—Extensions to West Twerton schools (£15,519), for City E.C.; J. Long & Sons, Ltd., builders. Extensions to works, for Stothert & Pitt, Ltd., Bristol Road.

Bexhill-on-Sea.—Development of Bedwell estate, for Chandos Investment Trust; J. E. Maynard, architect.

Birmingham.—Cinema at the corner of Flaxley Road and Wyndhurst Road, for H. Dare & Son, Ltd., 962, Alum Rock Road, Ward End. Alterations to Mental hospital, Lodge Road; D. E. Turner, architect, Hollymoor Mental Hospital, Northfield. Additions to factory, Wright & Co., Ltd., Thimble Mill Lane, Aston; Frank Davis, Ltd., builders, Stratford Road, Birmingham.

Bo'ness.—Houses (28); W. Beattie, burgh surveyor.

Braintree.—Houses (36), Kelvedon and Coggeshall; R.D.C. surveyor, Council Offices.

Brentford.—Clinic, Rothschild school site; borough engineer.

Bridgwater.—Additions and conversion into Council Offices the premises known as the Priory, St. Mary Street; F. H. J. Gabbutt, architect, Cornhill Chambers.

Brierley Hill.—Houses (597); U.D.C. surveyor. Houses (34), near Hickman Road, Brockmoor, for O. Moore.

Bruton (SOMERSET).—School (£30,000), for the governors of Sunny Hill Girls' school; clerk.

Burton-on-Trent.—Business stores, Tutbury Road, for the Co-operative Society; secretary.

Bury (LANCASHIRE).—Extensions to factory, Gigg, for the New Bury Paper Mills, Ltd.; W. Howarth, secretary.

Cardiff.—Houses (43), Corporation estate; J. & H. Bradford. High school for girls, Colchester Avenue; for E.C.

Chatham.—Houses (168), Central Park estate, for D. S. Pierson.

Clydebank.—Cinema (£25,000); A. B. King, 167, Bath Street, Glasgow.

Cockermouth.—Houses (50); U.D.C. surveyor.

Coventry.—Extensions to works for the Modern Machine Tools, Ltd., the Butts.

Darlington.—Houses, Polam Hill estate; Lawson and Boddy, builders, Yarm Road.

Denbighshire.—Schools, Mochdre, Colwyn Bay; director of education, Wrexham.

Devizes.—Cinema on site of Castle House, for A. A. Pilkington, Salisbury.

Dover.—Houses (24), Markland Road, for Elms Vale Estate Co., Ltd.; secretary.

Dunbar.—Cinema, Abbey Road; secretary, Inverness Investment Trust, Ltd., Inverness.

Dundee.—Houses (72), Morgan Street; D. B. McLoy, City Chambers.

Ealing.—Houses (49), Castle Road; Swannell & Sly, architects. Houses (44), Darynton Drive; R. Lancaster & Sons. Houses (84), Gonville Crescent; Hillingdon Estate Co. Houses, Oakfield Gardens, and bungalows, Stanhope Park Road; Houselands, Ltd. Houses, Rugby Avenue and Beaumont Gardens; Clayton Farm Estates, Ltd., Bridge Road estate, Hounslow. Cinema and shops, Western Avenue; W. J. King, architect, 16, Jermyn Street, London, W. Shops and flats, Hanger Lane and Queen's Drive; C. F. Day, Ltd., High Road, London, N.12. Extensions to Glaxo works, Greenford Road; Wallis Gilbert & Partners.

Eastbourne.—Houses (22); borough surveyor.

Edinburgh.—Houses (68), Pilton Avenue, for Mactaggart and Mickel, Ltd.; Stewart Kaye, architect, 14, Hill Street. Five schools, for Corporation E.C.; city architect.

Glamorganshire.—Additions to Nantyffyllon Council school, for C.C.; clerk to Council, Glamorgan County Hall, Cardiff.

Great Yarmouth.—Houses (28), Jubilee estate, Middleton Road, for H. A. Holmes & Son, Ltd.

Guisborough (YORKSHIRE).—Houses (38), Parkside estate; U.D.C. surveyor.

Haywards Heath.—Church, New England Road, for the Evangelical Free Church Council.

Hertfordshire.—Secondary school, St. Albans (£33,826), for County E.C.

Kearsley.—Houses, Jackson Street and Clough Street, Primrose Street and Church Street and Hulme Road; U.D.C. surveyor.

Kettering.—Houses (20), Summerfield Road; Waverley Building Co. Factory, Avondale estate, for Easifoot Footwear, Ltd. (Greenlees & Co.). School centre, School Lane, for E.C.

Leicester.—Cinema, St. Saviour's Road East, for the Super Cinemas (Leicester), Ltd., The Fosse; F. N. Smith, architect, Beaumont Chambers, 6, Pocklington's Wall.

Llanelly.—Church (£12,900), electrical work; I. Jones, builder.

London.—(DEPTFORD).—Factory, Alvar Street; Val de Travers Asphalt Co., Ltd., 106, Salisbury House, Finsbury Circus, E.C.2. (PADDINGTON).—Cinema, Harrow Road; Associated British Cinemas, Ltd., 30, Golden Square, W.1. (WEST HAM).—Varnish factory, for B. Winstone & Sons, Ltd., 150, Clerkenwell Road, E.C.1. (ST. PANCRAS).—Tenements (102), Leighton Road (£82,075); borough engineer.

Loughton.—Rebuilding of cinema, High Street; Howis & Belcham, architects, 9, Fenchurch Street, London, E.C.3.

Luton (BEDFORDSHIRE).—Houses (155), Pomfret Avenue, for H. C. Janes, Ltd.

Manchester.—Houses (47), near Longley Lane, Northenden; J. Swarbrick & Son, architects, 66, Mosley Street, Manchester. Houses, Red Bank Farm estate (£146,145), and clinic, Sharston; city architect. Factory, Harper Road, Northenden, for L. Faust. Elf Mill, Handforth, Cheshire; Cruickshank & Seward, architects, 16, Princess Street, Manchester. Factory, Waterloo Road and Allison Street, Hightown; Drury & Gomersal, architects, Imperial Buildings, Oxford Road, Manchester. School, Abbey Hey; E. Marshall & Sons, Ltd.

Melton Mowbray.—Houses (50), Welby Lane estate; W. H. Jarvis, surveyor, Egerton Lodge.

Middlesex.—Extensions to West Middlesex County Hospital (£45,000); county architect, 10, Great George Street, S.W.1.

Morecambe.—Cinema, Euston Road and Thornton Road; Robert Thompson & Morris, builders, Queen Street, Lancaster.

Moulton (NORTHAMPTONSHIRE).—Development of Wantage Farm estate; J. E. Lucas, Ltd.

Newbiggin-by-Sea.—Houses (106); J. Kailofer, architect, Surveyor, Council Offices.

Newcastle-on-Tyne.—Factories, Scotswood Road, for Michell Bearings, Ltd., South Benwell, and Vickers-Armstrongs, Ltd., Scotswood Road; staff architects.

New Forest (HAMPSHIRE).—Houses (28), Totton; A. F. Read, R.D.C. surveyor, Lyndhurst.

Packmoor (STAFFORDSHIRE).—Houses (84), Turnhurst Road; C. Sutton.

Pelaw-on-Tyne.—Cabinet-making factory for the Co-operative Wholesale Society (Newcastle Division); C.W.S., architects' dept., 90, Westmorland Road, Newcastle-on-Tyne.

Pewsey (WILTSHIRE).—Houses (20); R.D.C. surveyor.

Preston.—Houses (64), near Bent Lane, Leyland; G. F. Boyce, builder, 343, Devonshire Road, Blackpool.

Ramsbottom.—Extensions to hospital, including children's ward and operating theatre; R. J. Tyson, builder, Great Lever, Bolton.

Redcar.—Electricity showrooms, High Street; R. H. Cowie, builder, Ely Crescent.

Rickmansworth.—Houses (52); U.D.C. surveyor.

Romford.—Cinema, with kiosks and shops, for the Capitol and Provincial News Theatres, Ltd. (electrical work), £50,000; Fitt, Prior-Hale & Tomlinson, architects.

Seaham Harbour.—R.C. school; P. J. Stienlet & Son, architects, 5, Saville Chambers, Newcastle-on-Tyne.

Sittingbourne.—Bakery power house, for the Co-operative Society, Ltd.; secretary. Town hall and public offices; U.D.C. surveyor.

Smethwick.—Extensions to works, Brewery Street; Samuel Smith & Sons, Ltd. Extensions to works, Mafeking Road; Pneulac, Ltd.

Somerset.—Nurses' Home, Wells mental hospital (£20,350), for C.C.; Building & Public Works Construction Co., Ltd., builders, Swindon.

Stamford.—Houses (140) for the Bradford Property Trust, Ltd.; Walsh & Maddock, architects.

Stoke-on-Trent.—Houses (20), Shelton New Road; W. Branner & Co. Administrative block, London Road Institution; city engineer.

Stokesley.—Houses (24), Yarm, electrical work; Thornton Construction Co., builders, Stockton-on-Tees.

Sunderland.—Additions to premises for Hedley, Swan & Co., Ltd., High Street West; W. & T. R. Milburn, architect, 19, Fawcett Street.

Surrey.—Schools, Knaphill (£21,794), for County E.C.; secretary, Kingston-on-Thames.

Swansea.—Houses (87), Gelli-Grafog, for the Housing Committee; town clerk, The Guildhall.

Thornaby-on-Tees.—Swimming baths; P. Brown, borough engineer.

Thornton Heath.—Alterations and additions, 431, London Road; Castle Engineering Co., 431, London Road, West Croydon.

Todmorden.—Extensions to Sun Vale works, Walsden; O. Taylor & Son, Ltd.

Tunstall.—Houses (58), near High Street, Sandyford; L. Bates.

Wallsend-on-Tyne.—R.C. school, Willington Quay; R. Burke, architect, Singleton House, Northumberland Street, Newcastle-on-Tyne.

Wantage.—Houses (36); A. C. Whiting, builder.

Wellington (SOMERSET).—Cinema, with shops, Mantle Street, electrical work, for Honiton Cinema Co.

Wiltshire.—School (340 places), Lower Stratton, for County E.C.; T. Walker, county architect, Trowbridge.

Winsford (CHESHIRE).—Houses (61); U.D.C. surveyor.

Yorkshire.—County offices, Wakefield, for West Riding C.C.; clerk.